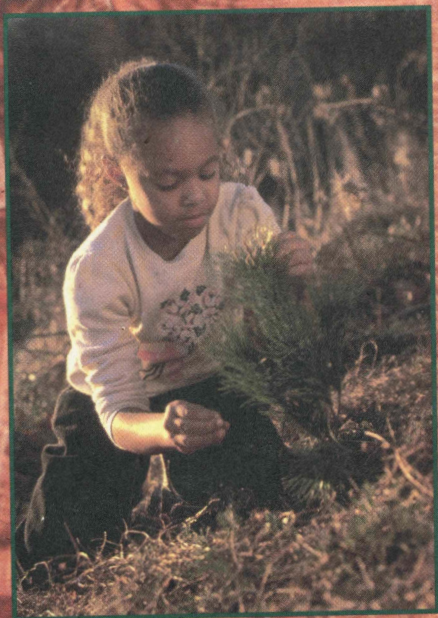
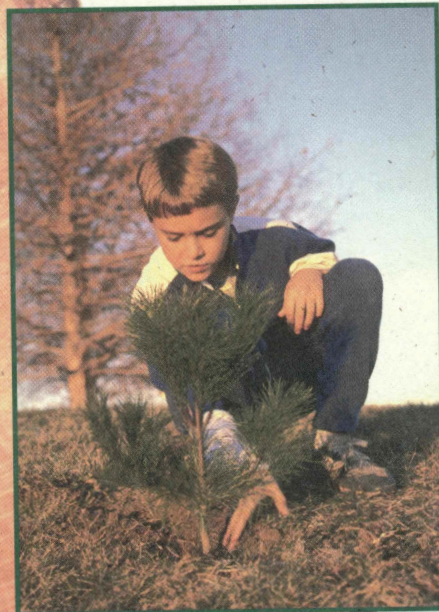


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# Arbor Week Activity Guide





# Care and Distribution of Seedlings



**A**t the nursery, the seedlings for your classroom have been graded, counted and bundled. Then, they are placed in cold storage until shipped to you. Usually the seedlings will reach your school within two days after leaving the nursery. The seedlings for all the fourth grade classes in your building will arrive in one bundle. These seedlings will need to be distributed among the classes. Following are ideas for care and distribution of your Arbor Day seedlings:

## **A. Prior to distribution of seedlings**

Have each student bring a clear plastic bag about the size of a bread wrapper from home.

## **B. When the seedlings arrive**

1. Pour cold water into the open end of the bundle to keep seedling roots moist, but not wet.
2. If possible, refrigerate seedlings (33-40 degrees); otherwise, place in a cool, shaded place. Protect seedlings from freezing, which would kill them.
3. Do not open the bundle until you are ready to distribute the seedlings to students.

## **C. At distribution time**

1. Package individual seedlings.
  - Wrap the roots of each seedling in paper towels.
  - Dip the wrapped tree in water and place in the plastic bag.
  - Tie the bag closed above the roots using string, tape or twist-ties.
2. Review planting instructions on The Right Tree in The Right Place poster with students. Emphasize that for the seedling to live, its roots must be kept moist until it is planted.
3. Be sure each student has a seedling tree and The Right Tree in The Right Place poster.
4. Encourage students to plant their trees as soon as possible.



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# Arbor Week Activity Guide

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# Dear Fourth Grade Teacher:

**T**his Arbor Week Activity Guide is dedicated to helping your students learn more about trees and conservation through hands-on learning experiences. Every lesson in this guide centers around a particular theme for each day of Arbor Week and provides you, the educator, with interesting and useful background information. You may want to choose a few or many of the daily activities that will enable your students to learn about the significance of trees in their lives and the contributions trees make to Missouri's environment and economy. The activities in this guide can supplement your lessons in **science, language arts, social studies, math, music, art and physical education**. You will even find an Arbor Day Ceremony to end your week of activities.

Included in this guide are colorful posters to enhance your teaching and "Kid's Pages" that can be reproduced for student use. In addition, each daily lesson provides measures for assessment of learning, rubrics for use as a grading guide and activities that easily can fit into your students' portfolios. A resource section is provided that contains additional lessons, poems about Arbor Day,

songs, games and activities that can be **used throughout the entire year**. Also included is information about Missouri's forest industry, planting trees and addresses for additional resource information.

Our "Adventures in Reading" section will help those of you who are working in a whole language classroom or using literature-based units with your students. Besides a large selection of literature, you also will find a list of videos that will enhance your Arbor Week program.

This Arbor Week Activity Guide is to be used in conjunction with the distribution of seedling trees. Each year the statewide Arbor Week Program results in the distribution of about 140,000 seedling trees and nearly 4,000 Arbor Week Activity Guides. If you have not received your seedling trees by the first Friday in April please call the State Forest Nursery in Licking, Mo., at 573/674-3229. After you receive your trees please store them in a cool, moist location until you are ready to distribute them to your students.

**HAPPY ARBOR WEEK!**

---

## A New Beginning

### TREES: A CROSS-CURRICULAR THEMATIC UNIT

The lessons in this Arbor Week Activity Guide are designed to be interwoven with each other. They incorporate the use of higher level and critical thinking skills. They are designed to encourage fluency, creativity and expansion of ideas. In addition, the lessons are designed to meet the different learning styles of your students. Each lesson ends with performance assessment activities. The rubric provided is meant to be flexible so you can assess knowledge learned based on the activities you have chosen to use. When completed, you can put these assessments into the students' portfolios. The Resource Section of this book is a great source for additional lessons, information and ideas. As you begin your Arbor Week activities, consider these ideas:

1. Develop a reading corner — a quiet place for treasuring books. Display several fiction and nonfiction books about trees and forests. Adventures in Reading, in the Resource Section, will give you a list of books that your students might enjoy. Make your reading area inviting by including carpeting, pillows,

rugs, comfortable chairs and a bookshelf or stackable crates. Invite the students to share their own favorite tree books.

2. Create a science table for displaying tree and forest-related items such as tree cookies, seeds, branches, leaves, tree bark, etc.
3. Create an art studio and gallery. Find a space where students can do leaf and bark rubbings, make collages of seeds, leaves, bark, twigs or express their creativity in ways best suited for them. Display their artwork in a special location.
4. Invite students to design a tree bulletin board or mural to go with different lessons in this guide.
5. Plug in the computer and let students enjoy the CD-ROM *Habitactics* which is either in your school library or available from the Missouri Department of Conservation. Check the Resource Section for information on ordering.



# The History of Arbor Day

**A**rbor Day is purely an American tradition that originated from a vision of the future by one man, J. Sterling Morton, of Nebraska. He was born in upper New York state on April 22, 1832. As a young man, Morton followed the movement of pioneers westward, and in 1854 he settled on the west bank of the Missouri River near the present town of Nebraska City, Nebraska, along with other states of the Great Plains, had almost no trees although the region's climate and soil were suitable for growing them. The land was more valuable for growing agricultural crops, so little emphasis was placed on raising trees.

Morton loved trees for their beauty and for the beautiful environment they created. He and his wife loved nature and together they planted the grounds of their home, "Arbor Lodge," with rare and exotic trees from all over the world. Morton's trees grew and flourished and he began to encourage his neighbors to plant trees. He then conceived the idea of planting trees all over the bleak plains of Nebraska. As a journalist and the editor of Nebraska's first newspaper, he began to spread his idea of planting trees. His fellow pioneers missed the trees that surrounded their former homes in the east. But most of all, they needed trees as windbreaks to keep the soil from blowing, as fuel for heating their homes, as shade from the hot sun, and for building materials. Morton wrote about tree planting in his articles and editorials. He encouraged individuals to plant trees and asked civic organizations and groups of every kind to join in. Morton became well-known for his articles and when he became Secretary of the Nebraska Territory, he continued to stress the values of trees.

On January 4, 1872, Morton first proposed a tree planting day to be called "Arbor Day." This first Arbor Day was held on April 10, 1872. Prizes were given to individuals and counties for properly planting the largest number of trees on that day. More than one million trees were planted on the first Arbor Day celebration in Nebraska. On March 12, 1874, Nebraska Governor Robert Furnas officially proclaimed Arbor Day as a tree planting holiday.



The Arbor Day idea quickly spread to neighboring states. During the 1870s other states passed legislation to observe Arbor Day. Missouri first observed Arbor Day in 1886. The legislature declared this a day to be set aside for the appreciation and planting of trees. Today we celebrate the event on the **first Friday in April**.

Schools quickly joined in the tree planting tradition. Fourth grade students throughout the state of Missouri continue this tradition as they participate in Arbor Week activities. Each year they plant about 140,000 seedling trees in celebration of Arbor Day.

J. Sterling Morton achieved fame around the world for his idea of Arbor Day. He was proud of the success of Arbor Day and noted, "Other holidays repose upon the past. Arbor Day proposes for the future." Each and every tree planted stands as a living reminder that we all bear responsibilities for protecting our future. We can help to make the future better by performing this simple act: planting a tree.



## Day 1 of Arbor Week



**Objectives:** Students will be able to explain the main parts of a tree and identify how these parts work together.

**Vocabulary:** air, absorb, bark, cambium, crown (canopy), deciduous, evergreen, heartwood, minerals, phloem, photosynthesis, root hairs, roots, sap, sapwood, trunk, xylem

**Poster:** Anatomy of a Dogwood

### BACKGROUND INFORMATION

This unit will help you learn about the different parts of a tree, and you will find out about some of the many products trees give us.

From the tree's roots buried in the ground, to the highest leaves in its crown, each part of a tree plays a role in helping it grow and survive. Following is a short description of each part and its important role.

#### TREES HAVE THREE MAIN PARTS:

the **roots**, the **trunk** and the **crown (canopy)**.

##### ROOTS

No one has ever seen an entire tree. That's because more than half of the tree is found below ground.

The **roots** are almost always underground and often spread as far as **twice** the height of the tree. Most of the tree's root system grows in the top 12 inches of the

soil. Roots grow as they search for **air**, water and **minerals**.

The root system varies in size and function. Large supportive roots keep the tree in place. In short, they keep the tree from tipping over in a storm. These large roots branch into smaller and smaller roots called fine roots. These fine roots are covered with **root hairs**. The tiny roots or root hairs absorb approximately 95 percent of the water and **minerals** needed by the tree.

Decaying organic material (leaves and wood) on top of the ground provides ample food for millions of insects, worms and other creatures. These tiny creatures do a lot to help trees. As they tunnel about in the surface layers searching for food, they create porous spaces for **air**, water and **minerals** that the **roots** need.

##### TRUNK

Page 11 provides a peek inside a tree.

The **trunk** consists of four layers of plant tissues. The outer layer is **bark**. It protects the tree from injury and insects. Trees like maple and beech have smooth bark. Oaks, some hickories, and persimmon have thick, rough bark. Some have bark that naturally peels off, like sycamore and river birch.

Just inside the bark are the next three layers. The **cambium** (KAM-bee-uhm) is the growing region and is only one cell wide. As it divides, it produces **phloem** (FLOW-uhm) to the outside of the tree and **xylem** (ZEYE-lem) toward the inside.

The **phloem** has vessels that move **sap** from the leaves to the rest of the tree. The phloem is sometimes called the inner bark.

The **xylem** contains the vessels that bring water and nutrients up from the roots to the leaves. **Xylem** also is called sapwood.

Older **xylem** cells become part of the **heartwood**. The **heartwood** is dead, woody tissue in the center of the tree. Its main job is to support the tree. As sapwood becomes heartwood, a darkening of the wood occurs in many species. This darkening is caused by tannins, dyes

#### Fun Root Tips:

- Most of a tree's root system is in the upper 6-12 inches of soil.
- A tree's root system spreads out 2 to 2 ½ times its height.
- Roots often are infected with a fungus called mycorrhizae. This fungus lives symbiotically with the tree. The fungus increases the tree's root area and thus increases the amount of water and minerals that can be absorbed.



and oils stored in the heartwood. These chemicals often make the heartwood more decay resistant.

### CROWN

The **trunk** provides support for the branches and the branches are covered with leaves. These branches and leaves make up the tree's **crown** or **canopy**. The leaves are also the tree's kitchen. Using energy from sunlight, carbon dioxide, and the water and minerals **absorbed** by the roots, the leaves make "food." This process of using the sun's energy to make food is called **photosynthesis**.

Some trees, like pine and spruce, keep their needles year-round. We call these trees **evergreen**. Others, like maple and ash, lose their leaves every fall. Before they drop, however, they will turn a spectacular orange, red or yellow. Trees that lose their leaves in the autumn are called **deciduous**.

You also might find flowers and fruits of the tree in the crown. The flowers and fruits allow trees to reproduce themselves. The fruit of an oak tree is an acorn, walnut trees produce walnuts, and pine trees bear their seeds in cones. Some fruits are tasty, such as apples and peaches.

## CURRICULUM

**Brain Wake-Up:** (Questions asked by the teacher to start students thinking.)

- Have you ever played in a tree?
- How did you use your tree?
- What do trees need to survive and grow?
- How do trees get these things since they cannot walk?
- How do food and water get around to all parts of the tree?

In this lesson we are going to learn about the different parts of a tree and how these parts all work together. Students will learn the answer to these questions when they do the activity "Tree Factory."

## SCIENCE

### ARE WE REALLY SO DIFFERENT FROM TREES?

When you compare yourself to a tree, your first impression might be that it is impossible. We are so different. Consider these comparisons:

What does your tree need to survive? (*It needs clean air to breathe, water to drink and sunshine to grow. It combines air and water with the energy from the sun to make sugar for food*). You also need food, water and clean air to survive.

Look at your body and the body of a tree. The tree is covered with bark which protects it from illness, just like our skin protects us from germs and illness. Under the bark, the sap is channeled to all parts of the tree, just like

our blood is channeled through our veins.

The trunk of our body is like the trunk of a tree, which helps us stand straight and tall. Raise your arms over your head. Our arms can be compared to the branches of a tree. Leaves of the tree can grab sunlight just as our fingers can grab objects.

Discuss one thing that trees can do that we cannot do: **produce their own food**.

### TREE FACTORY

**You'll need:** Slips of paper, green yarn cut into four 6-foot lengths, a wide-open area where students can build a tree.

**Getting started:** Write the following parts of a tree on separate slips of paper and distribute them to the class. You will need to adjust the numbers depending on the size of your class.

Heartwood	1
Sapwood	3
Taproot	1
Lateral roots	2
Cambium	5
Phloem	6
Bark	8
Leaves	4
Total =	30 slips of paper

**How to do it:** Introduce the topic of how trees grow and what they need to survive by asking the Brain Wake-Up questions listed at the beginning of this unit. Use the Background Information to answer these questions.

Tell students that they are going to create a tree by acting out the tree parts just discussed. Once the students are in a large open area, pass out the slips of paper identifying the role each student is to play.

Ask the students the questions in each of the following sections to keep them thinking.

### HEARTWOOD

What makes up the center of the tree and gives it strength (**heartwood**)? The student portraying heartwood should stand in the center of the open area, tighten his muscles, and chant, "I support; I support."

### SAPWOOD

What transports water to all parts of the tree (**sapwood**)? The sapwood students join hands to form a small circle around the heartwood. The students should chant, "Gurgle, slurp. Gurgle, slurp. Transport water." as they raise their hands up and down.



## ROOTS

How does the water get inside the tree (*it's absorbed by the roots*)? Have the taproot sit with his back against the sapwood and have the lateral roots lie down on the ground with their feet toward the sapwood and their arms and fingers spread out to represent root hairs. Have the roots make sucking noises.

## LEAVES

Where does the water in the sapwood travel (*to the leaves*)? Then have the heartwood hold the ends of the four pieces of yarn cut earlier. Give the other end of each piece to the students who represent leaves. Ask the leaves what they do all day (make food through photosynthesis). Have the leaves flutter their hands and chant, "We make food; we make food."

## PHLOEM

Ask the leaves what happens to all the food that the leaves make (*it gets transported to the rest of the tree*)? Ask everyone what part of the tree transports the food from the leaves to the rest of the tree (*phloem*)? Have the phloem students join hands and form a large circle around the tree. Then have them simulate the role of the phloem by reaching above their heads and grabbing for food, then squatting and opening their hands, releasing the food while chanting, "Food for the tree!"

## CAMBIUM

Have we left out an important part of the tree? What layer produces new sapwood and phloem to keep the tree growing (*cambium*)? Have the cambium students form a circle around the sapwood. The cambium should be between the sapwood and phloem. Tell them to sway from side to side and chant, "New phloem, sapwood and cambium. New phloem, sapwood and cambium."

## BARK

What final component of the tree is missing? Is it something that protects the tree (*bark*)? Have the bark students lock arms and form a circle that faces out from the center of the tree. Ask them to look tough and have them march in place while chanting, "We are bark. Please keep out."

When the tree is completely assembled, have all students act out and chant their parts simultaneously. If you want, you can end the exercise by telling the students that because their tree is old, it falls over. Let everyone carefully fall down.

*Adapted from Project Learning Tree*

For an extension to this activity, use Kid's Page 10, *Anatomy of a Dogwood*.

## INCREDIBLE EDIBLE PARTY

*You'll need:* different food products that come from trees.

Ask the students to think about products from trees that they have eaten during the past several days, weeks or months. Have the students bring in edible tree products. Here are some suggestions for tree foods to munch on at the party:

Fruits: apples, apricots, avocados, cherries, coconuts, dates, figs, grapefruits, lemons, limes, olives, oranges, peaches, pears, prunes, bananas

Nuts: almonds, cashews, chestnuts, pecans, walnuts, hazelnuts

Candy: maple sugar candy, chocolate

Spices: allspice, cinnamon, cloves, nutmeg

Food from sap: syrup, chewing gum

Have an incredible party!

For extensions to this activity, see Social Studies activity "Where Do Those Incredible Edibles Come From?" Math activity "Measuring the Incredible Edibles," Resource activity "Where Are The Incredible Edibles?"

## LANGUAGE ARTS

Read *The Giving Tree* by Shel Silverstein. Have the students think about a tree that has special memories for them. Ask the students to draw their "Giving Tree" and write a short story telling about this special tree.

## ADVENTURES IN READING

See "Adventures in Reading," page 50, for books to share with students.

## SPRINGBOARD FOR WRITING

Imagine that you are a tree in your backyard. What would you say to:

- the children playing beneath you?
- the child that asks you if you have a heart?
- the kids who carve their name in your bark?
- the children in your neighborhood who climb you?
- the animals that use you for their home?

## SOCIAL STUDIES

### WHERE DO THOSE INCREDIBLE EDIBLES COME FROM?

*You'll need:* world map or globe.

Before indulging in your incredible edible feast, have the students locate on the map where each product is grown. Discuss the type of climate and geographical features needed for the tree to grow. Discuss which products are grown in Missouri. How many can you find in your own town?



## MATH

### MEASURING THE INCREDIBLE EDIBLES

*You'll need:* metric or standard ruler, gram scale

Before eating your incredible edibles, measure the length, width, circumference and weight of the different items. Have the students record their answers.

### HOW BIG IS THAT TREE?

In early times people used different parts of their bodies to measure different things. What part of their body could they use to measure a tree or leaf? Using different body parts such as hand span, foot and arm span or length of finger or nose, have the student make these measurements. Have the student remeasure using a metric or standard ruler. How accurate was each type of measurement? Why did different students get different answers for their measurements?

For an additional measuring activity, use Kid's Page 9.

### How Big Is This Tree?

Answers for this activity:

Shining Sumac = 6 m, Flowering Dogwood = 12 m

Shortleaf Pine = 27 m, Persimmon = 18 m

## MUSIC AND ART

### SONG FEST

Have the students learn one of the songs provided on pages 48 and 49.

### LYRICAL LINES

Write your own tree lyrics to a familiar tune such as London Bridge, Bingo, Home on the Range, etc.

### RUB-A-DUB

Have the students do leaf, pine needle or bark rubbing. Gently place paper over a leaf or the bark of a tree. Using big crayons, colored chalk or oil pastel crayons, rub across the paper capturing the imprint of the leaf, needle or bark. Also have them note characteristics such as color, texture, thickness or thinness. Compare the features of each rubbing and the tree it came from.

## PHYSICAL EDUCATION

### JUMP ROPE JINGLE

Try this jingle as the students enjoy jumping rope:

Oak tree, oak tree you're for me

How many are there in Missouri?

Red oak, white oak, post oak, too

Bur oak, pin oak to name a few

Swamp white, scarlet, and now blackjack

These name colors and that's a fact

Oak tree, oak tree you're for me

How many are there in Missouri?

(Count 1, 2, 3, etc.)

## PERFORMANCE ASSESSMENT

### TASK STATEMENT

Students will demonstrate their knowledge of the different parts of the tree.

### INDIVIDUAL ASSESSMENT

Each student is to have the necessary art materials to create a model of a tree. They are to include and label tree parts and be able to explain what each part does or how it is used (orally or with labels). Kid's Page 10, *Anatomy of a Dogwood*, may also be used.

### GROUP ASSESSMENT

Students will make a field guide of trees in their school yard or in the neighborhood. To be included are drawings and measurements of leaves, estimates of tree size, bark rubbings and how we use this tree.

See Field Guide Assessment, page 8.

## RUBRIC

### DAY 1 STANDARD

To demonstrate an understanding of the main parts of a tree: crown, heartwood, roots, root hairs, sapwood, xylem, cambium, phloem, sap, fruits, nuts, branches, bark and leaves.

### QUALITY OF PERFORMANCE

4 = Exceeds performance standard

3 = Meets performance standard

2 = Developing toward performance standard

1 = Many errors made, does not meet standard



# Field Guide Assessment



Name: \_\_\_\_\_

Type of Tree \_\_\_\_\_

Average Leaf Width \_\_\_\_\_

Average Length \_\_\_\_\_

Height of Tree \_\_\_\_\_

Leaf Drawing:

Bark Rubbing:

How do we use this kind of tree? \_\_\_\_\_



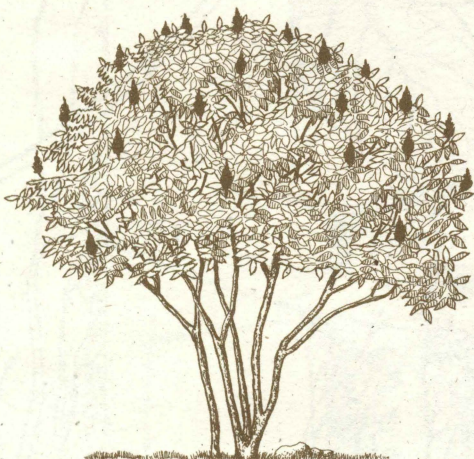
# How Big Is This Tree?



Name: \_\_\_\_\_

Measure the height of each tree with your metric ruler.

Use the scale for each picture to calculate how tall these trees will grow.



**Shining Sumac**

Scale: 1 cm = 1 m

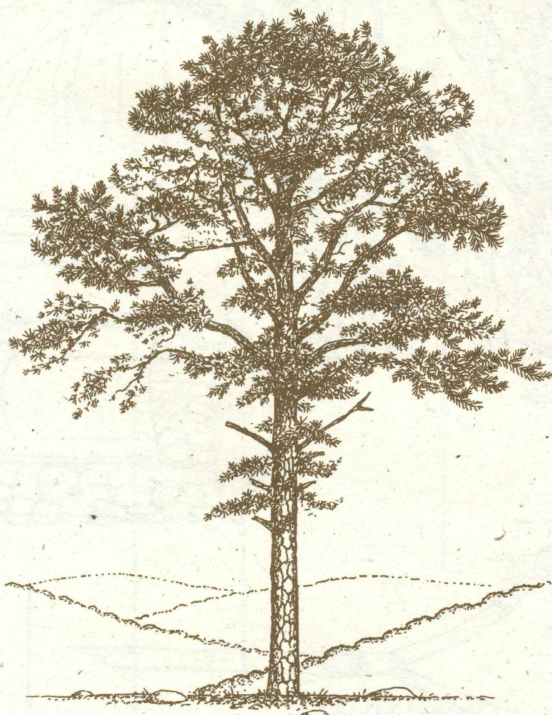
This tree is \_\_\_\_\_ tall.



**Flowering Dogwood**

Scale: 1 cm = 2 m

This tree is \_\_\_\_\_ tall.



**Shortleaf Pine**

Scale: 1 cm = 3 m

This tree is \_\_\_\_\_ tall.



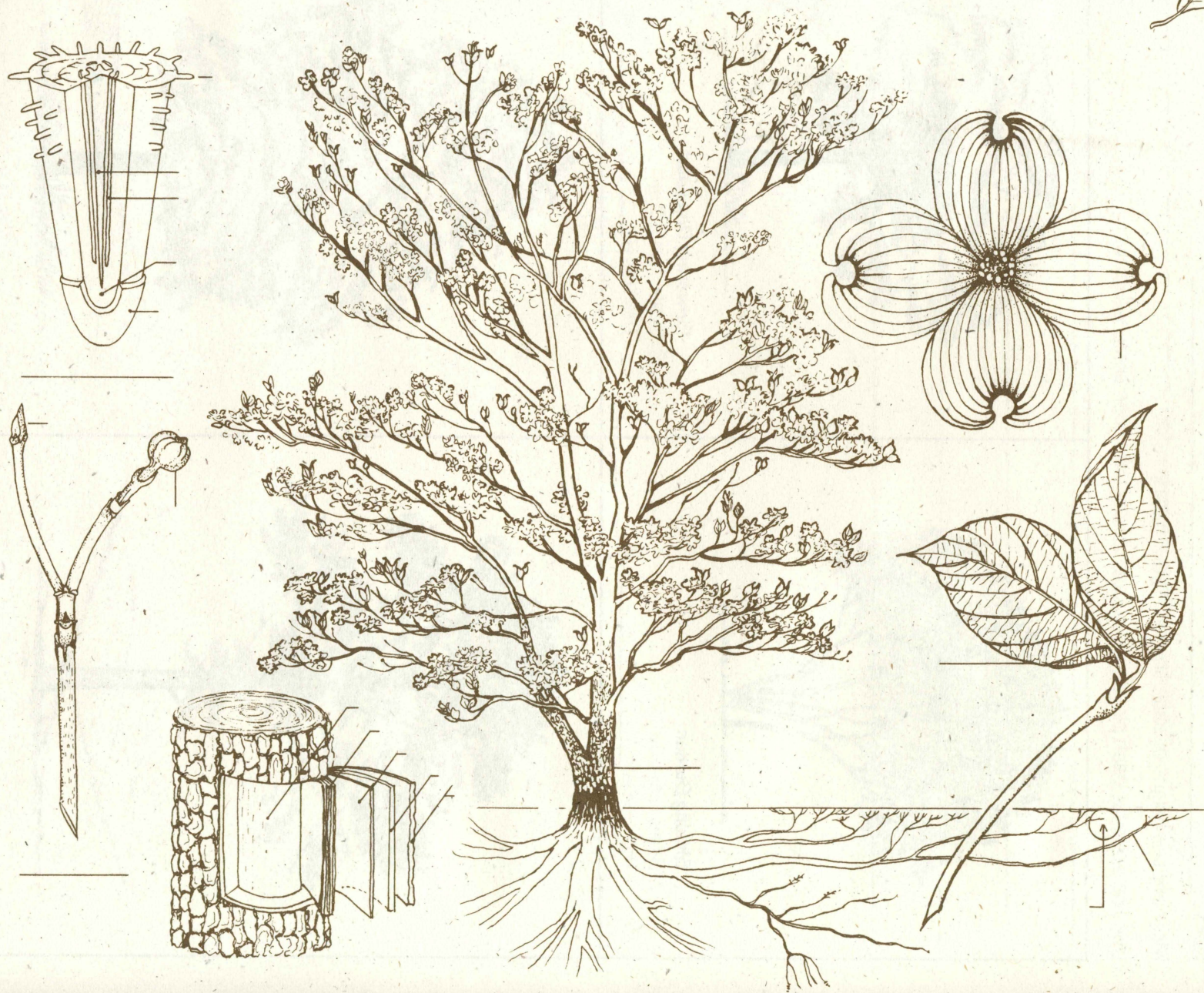
**Persimmon**

Scale: 1 cm = 2 m

This tree is \_\_\_\_\_ tall.

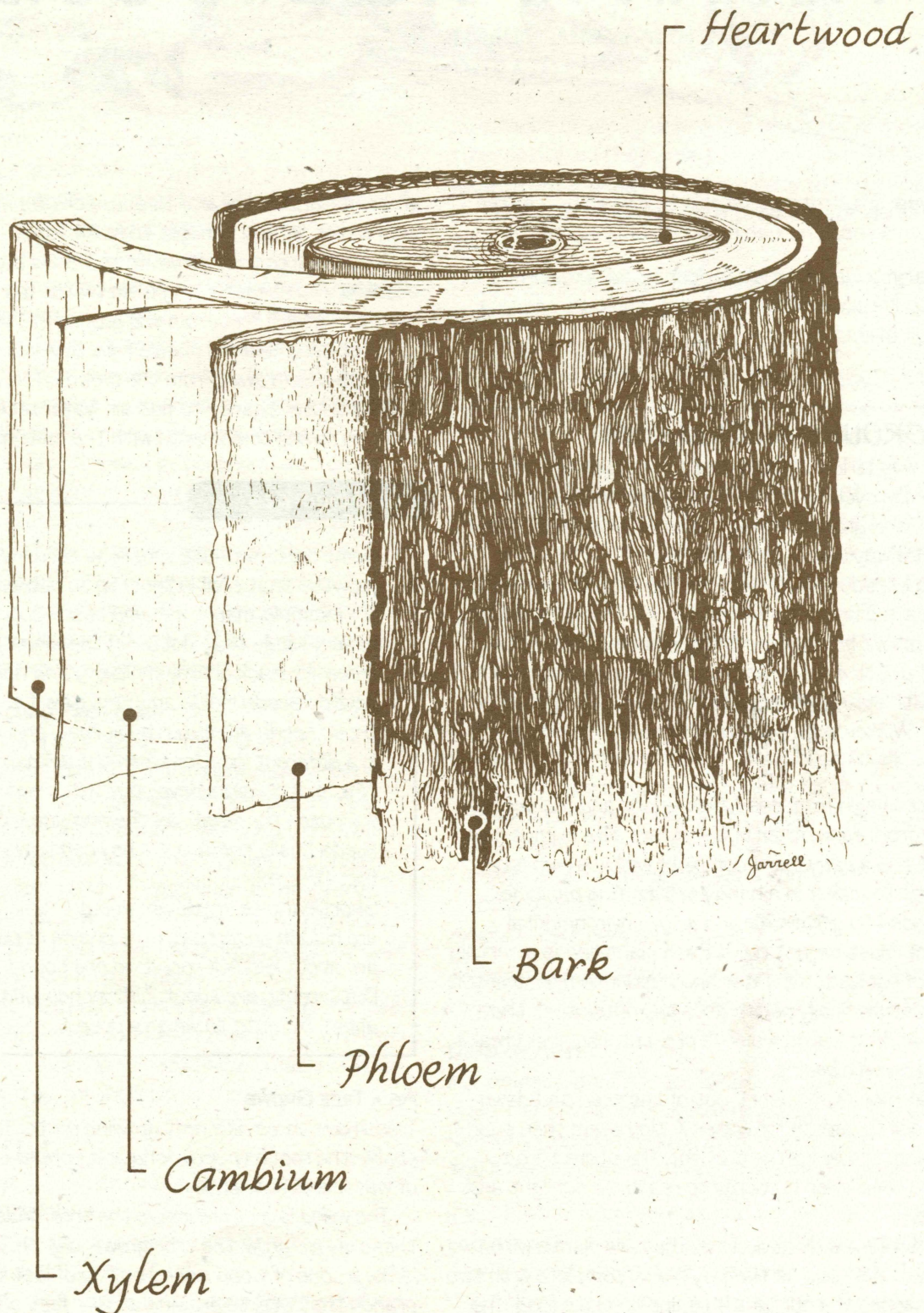


# Anatomy of a Dogwood





# Diagram of Tree Parts





## Day 2 of Arbor Week

# ACORN TO TREE TO SOIL



**Objectives:** Students will be able to explain how a tree grows from a seed through maturity until its death.

**Vocabulary:** buds, chlorophyll, decomposition, dormant, germinate, life cycle, roots, root tips, saplings, seedling, seeds, soil, stems

**Poster:** Life Cycle of a Tree

### BACKGROUND INFORMATION

The best way to learn about trees is to explore their life cycle. The life cycle of a tree, like all living things, begins with birth and growth. It may include injury, disease and aging, but always ends with death.

During Missouri's cold winters, the ground seems lifeless beneath a layer of snow and frost. This is misleading. Seeds that will be trees next summer, and roots and stems of existing trees, are simply waiting to renew growth with spring's warm weather. They are "asleep" or dormant. Winter is simply a time of rest.

#### SEEDS

Most trees begin from seed. Seeds look and feel very different from each other, but they are alike in important ways. Each is a baby plant complete with its own food supply, put together in a handy self-sealing package.

For a seed to germinate and grow, environmental conditions must be just right. Each plant needs a certain amount of sunlight, air, water and nutrients from the soil. When moisture finally penetrates the outer shell, the seed expands. If warmth also is present, the shell breaks open and growth begins.

A small root first pushes out of the seed and down into the soil to search for water. A tiny stem then pushes up reaching toward the sunlight. The stored food inside the seed gives it energy to reach for sunlight and moisture.

Most trees are dicotyledons. They are plants with two seed leaves. As soon as the tiny stem, complete with two leaves, reaches the sunlight it begins to make food. The

green material in the leaf tissue is chlorophyll. It acts with water, air and sunlight to make sugar.

A young tree that grows from a seed is called a seedling. A tree measuring from two to four inches in diameter at 4.5 feet from the ground is called a sapling.

Most seed-bearing plants have developed a way to disperse seeds away from the parent. This gives the new plant a better chance to find air, water and nutrients without having to compete with the mature tree.

### Seed Secrets

- Some trees produce very light seeds with sail-like growths that enable them to be carried by the wind. For example, maple, ash and basswood seeds have papery wings that flutter in the wind.
- Trees like black cherry, mulberry and dogwood develop seeds inside an attractive, tasty fruit. Those seeds are eaten by animals and deposited in a different location when the animal defecates.
- Witchhazel seeds develop within a pod that squeezes the seeds as the pod dries. When the seeds finally shoot out, they can travel up to 40 feet (12.2 m).
- Shortleaf pine seeds are about 0.12 inch long and are hidden underneath the scales of cones. There are about 46,300 seeds in one pound.
- Butternuts are about 2.75 inches long. It takes about 30 nuts to weigh a pound.

#### AS A TREE GROWS

Trees have three different growing parts. The root tips enable the roots to grow long and spread out in search of water and nutrients.

The wood layers are inside the tree, under the bark. As these layers grow, the tree grows in girth. Each new layer is like a cone of wood added on top of last year's cone. A branch that starts growing at four feet off the ground



always remains at four feet off the ground. It doesn't grow "up" as the tree gets taller.

The buds elongate into new twigs, enabling the tree to spread out to receive more sunlight. This makes the tree taller and wider. These buds also produce leaves and flowers.

### YEARS COME AND YEARS GO

Seasonal changes bring variety to a forest. During the spring, forest life is renewed. Many trees display showy flowers. The deciduous trees bud out as they begin to develop new leaves. Evergreens develop new shoots that later become new twigs and needles.

Late spring and summer bring growth. Flowers turn into fruit. Trees develop a full canopy of leaves. The woody layers inside the tree are adding a new layer of wood around the trunk and the branches.

In the fall tree leaves change to brilliant colors of reds, oranges and yellows. The shorter days and cooler temperatures cause the production of chlorophyll to stop. The chlorophyll already present breaks down and disappears. Yellow and orange colors that have been there all along, but hidden by the chlorophyll, now show through.

Warm, sunny days followed by cool nights often prevent the sap made during the day from leaving the leaves. The trapped sugar changes form and produces red or purple colors. The colorful leaves remain on the tree for a few weeks and then fall to the ground.

During the fall most trees also disseminate their fruit. These seeds lie dormant in the leaf litter and soil until warm spring days begin germination.

### NATURE'S RECYCLING PROGRAM

As each living thing dies, decays and returns to the soil, it affects the area around it and changes the environment. One plant's death may make it possible for new plants to grow. For example, oak trees need full sunlight to grow and develop into large trees. Small seedlings often will wait years on the forest floor growing very slowly. With the death of a nearby dominant tree, these seedlings immediately will begin to grow, trying to establish themselves in the forest canopy.

Decomposition returns nutrients to the soil. As trees decompose, they provide food and cover for a variety of animals, birds and insects. In turn these creatures help break down the tree, returning it to the soil.

## CURRICULUM

**Brain Wake-Up:** (Questions asked by the teacher to start students thinking.)

- Have you ever picked up acorns, hickory nuts or walnuts from around a tree?
- Do all trees produce nuts? (No, some trees produce

fruit or berries.)

- Do all trees produce seeds? (Yes, to reproduce a tree must have seeds.)
- Which part of the tree produces seeds? (The branch tips in the canopy of the tree.)
- When a tree in the forest dies, what happens to it? (It decomposes and returns nutrients to the soil.)

## SCIENCE AND HEALTH

### BUILD A TREE

Have the students spread out so they have room for movement. Begin by asking the students how they know trees are alive (they grow). How do new trees start to grow (from a seed)? What happens to them when they die (they are used for wood products or decompose into soil)?

Have the students enact the life of a tree by doing the following:

- Curl up in a tight ball - you're a seed.
- Uncurl and kneel - you've sprouted.
- Stick up one arm (fist clenched) - you've grown a branch.
- Stick up the other arm - you've grown another branch.
- Wiggle your fingers - you grow lots of leaves.
- Stand up (feet together) - you grow tall.
- Spread feet apart - you spread out lots of roots.
- Wiggle your toes - you grow lots of little roots.
- Start scratching all over - you're attacked by insects and fungi.
- Make a loud noise (kchhhh!) - you get hit by lightning and lose a limb.
- Smile and sigh (ahhhh!) - you become a home for wildlife in your old age.
- Make a hammering noise (knock, knock, knock) and vibrate - woodpeckers peck into your dead wood.
- Make a creaking sound and fall down - you blow down in a storm.
- Stick up one arm - a new seed sprouts from your rotting wood.

*Adapted from Project Learning Tree*

For an extension of this activity make copies of Kid's Page 16, "Cycles of Life." Answers are on page 17.

### DEAD OR ALIVE

**Recommended:** Prior to doing this activity, show the video *The Puzzle of the Rotting Log* (see the Video Resource Section page 51 on how to order).

**You'll need:** dead log, magnifying lenses (optional)

If you have a dead log or an old tree stump to look at, take your students out to look at it; otherwise, bring in a dead log. Look carefully at the log or stump to see what signs of life are there (a hand-held magnifying lens might



be helpful, but is not necessary). Be sure to look over and under the log. Look for trails, holes, nests, fungi and larva. Carefully peel back a piece of the bark and see what is moving under it. Here are some questions to think about while exploring the tree.

1. What are the different types of creatures that inhabit this log or stump?
2. Are dead trees and live trees inhabited by the same type of creatures?
3. What value does a dead tree have to the forest and its creatures?
4. Is it possible to tell what caused the death of this tree?
5. What "gifts" does this tree give to the forest after it dies?

Tie in what you have just seen and discussed with the Language Arts activity, "Write About It."

For an extension to this activity, look for a pile of leaves that have been undisturbed on the ground over the winter (or rake a pile of leaves, water the pile, then check after one to two weeks). Gently peel off the layers of leaf matter and see the difference in the decomposition of the different layers of leaves. What types of decomposers are in this pile? Discuss the similarity between the decomposition of the log and the leaves and the role that decomposers play in this process.

## LANGUAGE ARTS

### WRITE ABOUT IT

If you could be any of the creatures living and working in the dead log what would you be? What would be some of your activities? Who else would share this home with you, and how well do you get along? Write and illustrate a story about your home and life in the log.

### THE MAN WHO PLANTED TREES

Read to your students *The Man Who Planted Trees* by Jean Giorno and Michael McCurdy or show them the video (same title). Questions for discussion:

- What were the environmental conditions like before Elzard planted the trees? What were they like afterward?
- What changes did the narrator notice between visits?
- What was the author's message about the difference one person can make?

## SOCIAL STUDIES

### STATE SYMBOLS

Look up information on the state tree of Missouri, the flowering dogwood, and the state flower, the hawthorn. Some questions for discussion might be:

1. When was this symbol adopted?
2. What does this symbol represent?
3. Why was this species chosen?
4. Would you choose the same species? If not, which one would you have chosen?
5. Where can these symbols be found in our community?
6. Why do other states have different trees for their state symbol?
7. How many states have a tree flower as their state flower?

## MATH

### BIG SEEDS AND LITTLE SEEDS

*You'll need:* gram scale, graph paper, a variety of seeds such as a peach, avocado, coconut, walnut in a shell, acorn, hickory nut, Brazil nut, almond, etc.

Have the students predict the weight of each seed. Then weigh the seed on a gram scale to find its actual weight. Have the students graph the weight of each seed.

## MUSIC AND ART

### LIFE CYCLE OF A TREE

*You'll need:* art supplies and paper

Create a mural of the different stages of a tree, beginning and ending with a sprouting seed to show the restart of the cycle.

### FOREST SOUNDS

*You'll need:* rhythm band instruments, any materials to help create forest sounds.

Gather rhythm band and other instruments and create your own forest music. How does a forest sound? Which instrument(s) would you use to create the sounds of soft breezes through the leaves, strong wind through the needles or leaves, squirrels leaping from branch to branch, birds calling, a tree being chopped down or falling? How about feet shuffling through the fall leaves, a deer running through the bushes, a woodpecker pecking or an owl calling? Would a forest sound different at night than during the day? Create your forest sounds with the instruments and tape record your best efforts. Invite others to listen to your tape. Do others "hear" your forest the same way that you do?

*Adapted from Minnesota Arbor Month*

## PHYSICAL EDUCATION

### CREATE A FOREST

*You'll need:* four hoops and one bean bag for each team.

Divide students into equal relay teams. Assign one person to be the scorekeeper for each team. Place the hoops



at 15, 30, 45 and 60 feet from the starting line. The first hoop represents the seed setting in the ground. The second hoop is the young seedling. The third hoop is a mature adult tree. The last hoop is a decomposing log. The first student in each line takes a bean bag and races to plant the seed (places bean bag in first hoop) then races back to the starting line. The second student races to the first hoop and moves the beanbag to the second hoop (the seed is now a seedling), then returns to the starting line. The third student moves the bean bag from the seedling hoop to the third hoop (the seedling is now a mature tree). He runs back to the line and the fourth student races down and moves the beanbag to the fourth hoop (the tree is now decomposing). He races back to the line and the fifth student runs down and removes the bean bag from the last hoop and returns it to the next student in line. They now have four trees in their forest. Keep repeating this process until a preestablished time limit is up. The team with the most trees in their forest is the winner.

## PERFORMANCE ASSESSMENT

### TASK STATEMENT

Students will demonstrate their knowledge of how a tree grows.

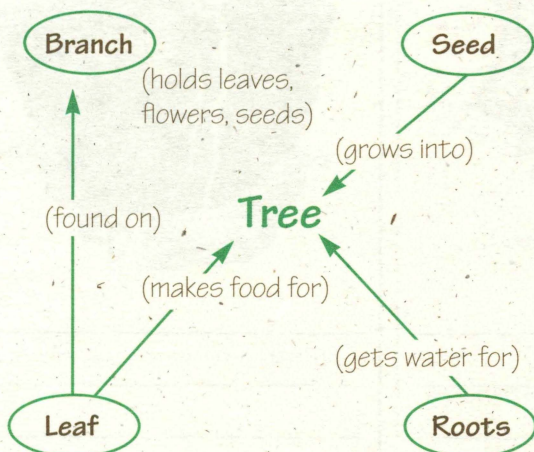
### INDIVIDUAL ASSESSMENT

Each student is to write a detailed paragraph(s) describing "My Life As A Tree, From Seed to Soil."

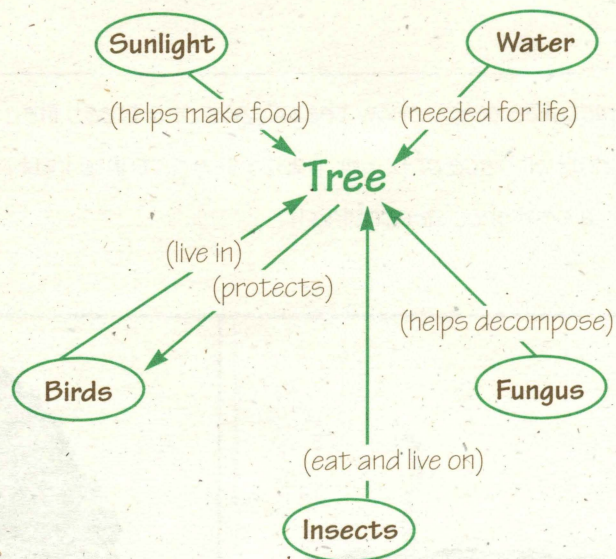
### GROUP ASSESSMENT

Write the word "Tree" on the board. Ask students to think of parts of a tree (or things that affect the growth of trees) and list them around the word "Tree." Have students draw lines to the tree or to other parts and write what each part does for the tree.

### EXAMPLE #1:



### EXAMPLE #2:



### RUBRIC

#### DAY 2 STANDARD

To demonstrate an understanding of how a tree grows from a seed through maturity until its death.

#### QUALITY OF PERFORMANCE

- 4 = Exceeds performance standard
- 3 = Meets performance standard
- 2 = Developing toward performance standard
- 1 = Many errors made, does not meet standard



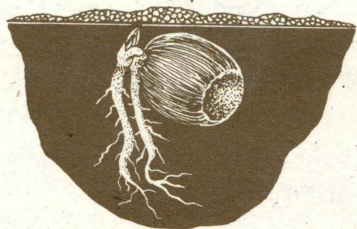
# Cycles of Life



Name: \_\_\_\_\_

The pictures below show the stages of a tree's life. Cut out the pictures along the dashed lines.

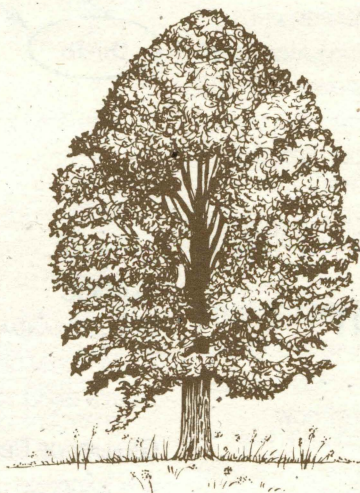
On another piece of paper, paste the pictures in the order in which the tree grows. Below each picture, write a sentence describing it.



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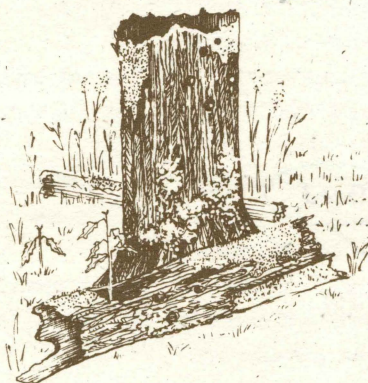
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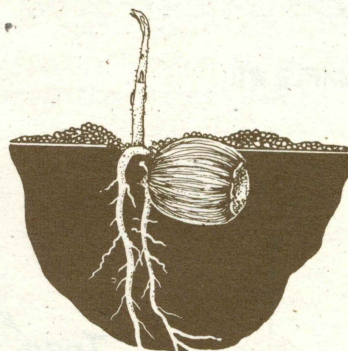
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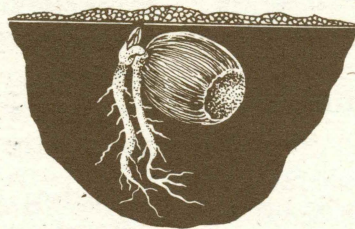


# Cycles of Life

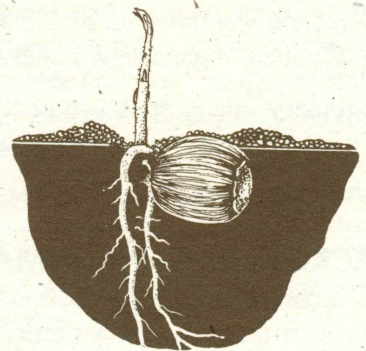
Answers:



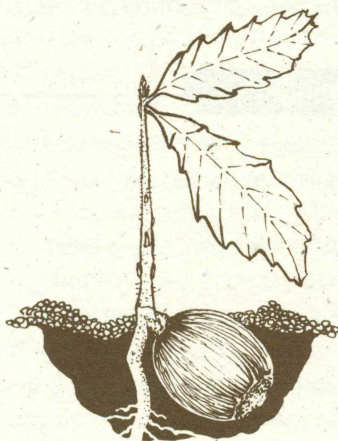
1. The seed is planted.



2. The seed germinates and roots begin to grow underground.



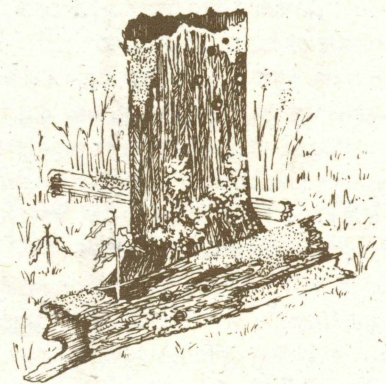
3. The stem pushes above the ground reaching toward the sunlight.



4. Leaves appear on the seedling.



5. After years of growth the tree reaches maturity.



6. The old tree dies and decomposition begins. Eventually it turns into soil again.



## Day 3 of Arbor Week



**Objectives:** Students will be able to count annual rings, understand why the rings are different colors, and identify times of good growth and stress.

**Vocabulary:** annual rings, dendrochronology, drought, springwood, summerwood, cross section (tree cookie)

**Poster:** History Writer of the Forest

### BACKGROUND INFORMATION

Fire, floods, drought, insects, diseases and competition from other trees for sunlight and water all influence a tree's struggle to grow. Within each tree is a record of that struggle. This record is locked in the tree's growth rings.

Each year, a tree will add a new layer of wood to its trunk. We see this as a "ring" when we look at a **cross section** of the tree (a **tree "cookie"**). In the spring, when the tree is growing fast, the xylem cells are large with thin walls. This lighter colored part of the ring is called the **springwood** or earlywood. Through the summer, the growth rate slows and eventually stops. As growth slows, the walls of the xylem cells become thicker and appear darker than the earlywood. This area of the annual ring is called the **summerwood** or latewood. Together, the wide, light colored springwood and the narrow, darker summerwood form one annual ring. By counting either the light rings or the dark rings, we can tell how many years the tree has been growing (or its age).

We know from Day 1 Activities that each tree needs air, water, space and minerals (food from the soil) to live and grow. What changes in the availability of these requirements would cause the rings to be different widths during different years?

**Possibilities:** The width of each year's annual ring varies depending on weather and other environmental factors. **Drought** causes slower growth with narrow rings, while abundant rainfall will increase growth, producing wider rings. Droughts usually do not last longer than two or three years, so a long series of narrow rings sug-

gests crowding from neighboring trees. Years of poor growth followed by good growth probably means the tree was released from competition, maybe because its neighbors were cut or died. A growth pattern of narrow rings on one side with wide rings on the other shows the results of crowding on the side of the tree where the rings are narrow. An early winter or stress from air pollution, root damage, disease, etc. also would cause a change in the width of the rings.

Other things we can tell from looking at tree rings include:

- fire frequency and intensity (black scars and height on tree)
- animals in area (claw or chew marks)
- insect attacks (tunnel marks)
- location of old branches (triangular scars)

The science of studying the past by looking at tree rings is called dendrochronology. Scientists can study tree rings and collect all this information without cutting the tree down by boring the tree instead. A hollow instrument called an increment borer can be drilled into the center of

### Missouri Forest Highlights

- Of Missouri's 44 million acres, 14 million are forested
- 85 percent of Missouri's forest land is owned by private individuals
- There are about 800 forest loggers and 500 sawmills in Missouri
- 40 percent of Missouri households have wood heating facilities
- 40,000 acres of forest land are damaged by forest fires every year
- 4 million trees and shrubs are grown each year at the state forest nursery
- 140,000 seedling trees are given each year to all Missouri fourth grade students in celebration of Arbor Day



the tree trunk. A long narrow cylinder of wood similar to a pencil is removed through the tube of the borer. The growth rings appear as lines on the wood cylinder and provide the same information as a slice of the tree.

## CURRICULUM

**Brain Wake-Up:** (Questions asked by the teacher to get students thinking.)

- How can we tell the age of people around us?
- How can we tell the age of a tree? (*By counting the annual rings*)
- If you were to look at a stump of a tree, what information could it tell you about the tree that was once there? (*Age, growth patterns, drought years, injuries*)
- Is there any way that you can tell how old a tree is without cutting it down? (*Increment borer sample*)

## SCIENCE

### TREE COOKIES

**You'll need:** A copy of "Mrs. Dalton's Cabin" for each student, Kid's Page 21.

Knowing something about the history of an area will help you understand the growth pattern found in tree rings. Most Ozark forests were cut for lumber between 1880 and 1920. Many people were employed as loggers and sawmill workers during this period, including Mrs. Dalton's grandfather. Most of the pine trees were cut for building lumber, and oak trees were made into railroad ties. When all the trees were cut, the sawmills closed, leaving unemployed workers to try to make a living farming in the rocky hills.

For many years, settlers burned the woods every year. They thought this would get rid of the trees and make more grass grow for free-ranging livestock. Instead, this created serious problems. By the mid-1930s, Missouri's forest and wildlife resources were at an all-time low. The forests were burned and abused. Gravel, eroded from the hillsides, choked the once-clear streams. In the late 1930s, the Missouri Department of Conservation was formed. Foresters began to help people, like Mrs. Dalton's grandparents, care for their land. Today we all enjoy the beauty and the resources that our forests provide for us.

Have the students read the story "Mrs. Dalton's Cabin." Looking at this Kid's Page, have the students answer the questions about the life of the tree (assume the dot at the center is year 1 of the tree's life).

Answers:

1. 18 years
2. 1908
3. fire
4. an old branch

5. 13 years
6. rings are wider on the left
7. began - 6 years, ended - 10 years
8. began - 1896, ended - 1900

For a recipe on how to make your own tree cookie see Resource page 45.

## LANGUAGE ARTS

### THE VOICE OF THE WOOD

Read to the students *The Voice of the Wood* by Claude Clement (see *Adventures in Reading* page 50).

For additional activities see Music and Art: "Listen to the Voice of the Wood" and "The Beauty of Trees."

### COOKIES AND STORIES

After looking at samples of tree cookies (cross sections), have the students write about the events that happened in the life of that tree from the tree's perspective. Have the tree tell about events in history that could have occurred during its lifetime.

## SOCIAL STUDIES

### TIME LINES

**You'll need:** "Tree Cookie" Kid's Page 22, paper, scissors, and glue, or real tree cookies.

After the students have completed the science activity "Tree Cookie," have them cut out the tree cookie and glue it onto a piece of paper. Show them how a tree cookie also can be used as a time line. Have them label the tree according to specific dates and events in history. Students can match the tree rings with significant dates in world, national, state or local history. For more variety assign small groups of students to different years in which the tree was cut down (i.e., 1996, 1985, 1953, 1921).

## MATH

### COOKIE GEOMETRY

**You'll need:** ruler, measuring tape, tree cookie, or copies of "Tree Cookie" Kid's Page 22.

Introduce the terms circumference, diameter and radius. Measure to find the circumference, diameter and radius of the tree cookie.

### IF THE COOKIE COULD TALK

If the "tree cookie" could talk what would be its answers to these questions? Assume that the tree was cut down this year. (Have the students work in small groups to answer these questions.)

1. How old was the tree when the student was born?
2. How old was the tree when the student started Kindergarten?



3. How old was the tree when the school was built, or how old was your school when the tree germinated?
4. How old was the tree when the last president was elected?
5. In what year did the tree celebrate its tenth birthday?
6. What was the tree's circumference and diameter when it was 10 years old?
7. What are its circumference and diameter now? What is the difference in the size of the tree from its 10th birthday and when it was cut down?

(Keep the group answers and use them as a group assessment measure.)

## MUSIC AND ART

### LISTEN TO THE VOICE OF THE WOOD

Have students listen to these musical pieces featuring cellos:

- J. S. Bach - Suite No. 3 in C Major for unaccompanied Cello BWV 1009
- Shostakovich - Cello Concerto in E Flat Major, Op 107
- Haydn - Op 101 in D
- Vivaldi - Concerto in E Minor
- Boccheini - Concerto in B Flat

### THE BEAUTY OF TREES

*You'll need:* charcoal pencils and drawing paper

After sharing the story *The Voice of the Wood*, have the students do charcoal drawings. Remind them that charcoal is a wood product produced in Missouri. Use the charcoal pencils to make sketches of trees (leafless trees are good subjects for sketches).

## PHYSICAL EDUCATION

### PROTECT THAT TREE

*You'll need:* two Indian clubs, bowling pins or cones, and two volleyballs or rubber playground balls.

This game is played similarly to dodge ball. The object is to protect the tree from injury caused by fire, lawn mowers, broken limbs or nails.

Two teams compete against each other as separate circles. The circles should be of the same size. The players of each team are numbered consecutively, so that each player in one circle corresponds to a player in the other circle. These numbered players, in sequence, go to the center of the opponents' circle to compete for their team.

In the center of each circle an Indian club, bowling pin or cone is placed which represents the tree. The center player is to guard the tree from being hurt (knocked over) by a ball which represents fire, lawn mowers, nails or broken branches. To enliven the game, have the students

pass the ball to three different people in their circle before the ball can be thrown at the tree. The circle that knocks down the tree first scores a point. The next number then goes to the center of the opponent's circle to protect the tree. After all players have competed, the team with the most points wins.

## PERFORMANCE ASSESSMENT

### TASK STATEMENT

Each student will demonstrate their knowledge of information that tree cross sections tell us.

### INDIVIDUAL ASSESSMENT

*You'll need:* a paper plate for each child, crayons or markers, sticky labels (optional).

Have each student use a paper plate to create a tree cookie the same age as themselves. They can use sticky labels to identify when important events in their lives took place, such as when they were born, when they started school and so on. To reinforce Day 1 Activities, have the student use the bumpy perimeter as the bark, the smooth inside edge as the cambium and center circle as the xylem.

### GROUP ASSESSMENT

Use the students' responses from the activity "If the Cookie Could Talk."

## RUBRIC

### DAY 3 STANDARD

To demonstrate an understanding of annual rings and the information that a cross section can tell us about the life of a tree.

### QUALITY OF PERFORMANCE

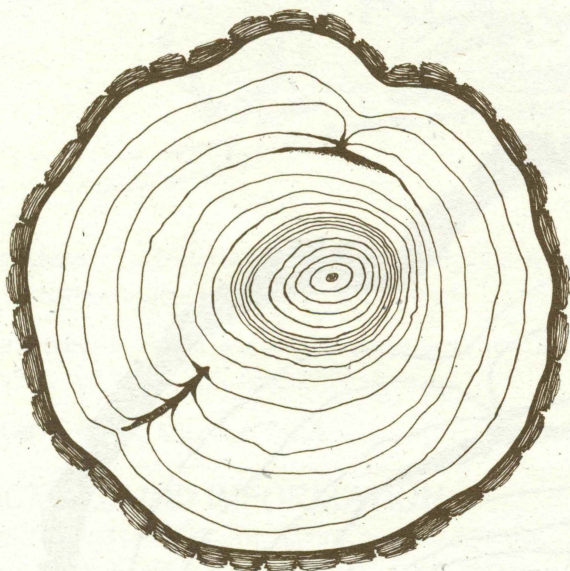
- 4 = Exceeds performance standard
- 3 = Meets performance standard
- 2 = Developing toward performance standard
- 1 = Many errors made, does not meet standard



# Mrs. Dalton's Cabin



Name: \_\_\_\_\_



In this activity you will look at a tree cross section, or tree cookie. This tree cookie was taken from a tree used to build a log cabin in the Ozarks.

Mrs. Dalton, the fourth grade teacher, told her students that her great-grandfather planted this tree in 1891, the same year that her grandfather was born. When her grandfather was 18, he decided to build a log cabin for his new wife. He cut down this tree to be used as a frame for the glass window that he had sent from St. Louis. Assume the cabin was built the same year the tree was cut.

**See if you can answer these questions.**

1. How old is this tree? \_\_\_\_\_
2. In what year was this tree cut down? \_\_\_\_\_
3. What could have caused the scar near the top of the cookie? \_\_\_\_\_  
\_\_\_\_\_
4. What made the scar on the lower part of the cookie? \_\_\_\_\_  
\_\_\_\_\_
5. How old was the tree when the branch appeared? \_\_\_\_\_
6. What evidence do you see that the tree was crowded on the right side? \_\_\_\_\_  
\_\_\_\_\_
7. There is evidence of a drought. How old was the tree when the drought began and ended? \_\_\_\_\_  
\_\_\_\_\_
8. In what years did the drought begin and end? \_\_\_\_\_



# Tree Cookie





## Day 4 of Arbor Week



**Objectives:** Students will be able to identify how trees and humans are dependent upon each other.

**Vocabulary:** economy, goods, interdependent, natural resource, renewable resource, urban forests

**Poster:** Common Missouri Trees

### BACKGROUND INFORMATION

There is a close relationship among soil, water, trees, wildlife and humans. Each is *interdependent* upon the others. Humans depend on trees in many ways. We use our forests for products, recreation and environmental protection.

Trees are found throughout the United States. In fact, the United States has 731 million acres of forest land that make up about one-third of our total land base. To be classified as forest land, the area must be at least one acre and contain about 10 percent tree cover.

Missouri has about 14 million acres of forest land out of a total land area of 44 million acres. Most of the forest is oak and hickory and is concentrated in the southern and eastern parts of the state. Of this forested land, about 85 percent is privately owned, 12 percent under federal control, and 3 percent managed by the state of Missouri and local governments.

This forest land provides a variety of benefits, products and jobs. Missouri's forest industry is much like every other industry based on a major *natural resource*. It gives us *goods* that are important to our state's *economy* and to the lives of our people.

Lumber and other products from the forest contribute 3 billion dollars to Missouri's economy each year. Missouri is a leader in the production of charcoal, barrels, walnut lumber and walnut nutmeats. Public and private forest land also provides opportunities for hunting, camping, hiking and other recreation.

Luckily, trees are a *renewable resource*. To *renew* means to begin again, to restore or revive. A *resource*

is something that is a source of help or of value.

Resources can give us things we need, or they can be sold for money.

Trees are a renewable resource because you can use them now and also grow a new crop that will give us more trees in the future. This is different from some of our other natural resources. Silver, gold, oil and gas, for example, are mined from the ground. When they are gone, they are gone forever.

Despite being renewable, unwise management, wildfire and attack from insects and diseases threaten our forest resource. Each year, wildfires burn about 40,000 acres of land in Missouri. Millions of lumber-producing trees also are weakened or damaged by insects or diseases.

The job of the Forestry Division of the Missouri Department of Conservation is to help protect and manage our forest resources. Through Forest District Offices, the Forestry Division serves landowners by suppressing wildfires and providing assistance for forest management and pest control. For more information about forestry programs contact your local district forester or the State Forester. See page 54 to find the office nearest you.

### Tree Tips

- The average American uses the equivalent of one tree — 100' tall and 16" in diameter — each year for wood and paper needs.
- Missouri forest industries employ 33,000 people, with nearly \$500 million in salaries.
- Missouri is a leader in production of walnut for fine veneer, gunstocks and bowls; charcoal; white oak barrel staves; and redcedar novelties and souvenirs.
- Wood industries contribute \$3 billion to Missouri's economy each year.
- Careful cutting of trees creates a greater diversity of plant and animal life in the forest.



## CURRICULUM

**Brain Wake-Up:** (Questions asked by the teacher to get students thinking.)

- What is something that you use that comes from a tree?
- Besides the products that we use, what else can trees do for us?
- What can we do to help trees?
- What does the word "interdependent" mean? (*two or more things that are dependent upon each other*)

## SCIENCE

### MISSOURI TREE PRODUCTS

**You'll need:** copy of Kid's Pages 28 and 29, "Missouri Forest Products" for each child.

Invite the students to work in pairs to name and list as many trees as they can think of that are found in Missouri. Have them share their list with the rest of the class. (*Page 31 lists trees that are native to Missouri.*)

In this activity the teacher will read a description of the Missouri trees listed on the Kid's Page and the products that we get from each. The students are to listen carefully to the description. Then, the students are to write a description of the wood and/or list the products that we make or use from that tree next to its picture.

**Shortleaf pine** This is the only pine native to Missouri. It often is used for pallets, pulp and lumber. When treated with preservatives, it can be used for decks, fence posts and landscape timbers.

**Eastern Redcedar** A pleasant smelling wood with a color and scent that makes it popular for cedar chests, closet linings, novelty products and animal bedding. The red heartwood is decay-resistant, making it useful for fence posts.

**White Oak** The wood of white oak is watertight so it is used for making barrels to age wine. It also can be used for lumber, flooring, furniture, trim and cabinets.

**Red Oak** Found over the entire state, red oak is a heavy, hard, strong wood used for pallets, furniture, cabinets, firewood, charcoal, railroad ties, hardwood flooring, paneling, trim and landscape timbers.

**Hickory** This wood is very tough and is used for the handles of axes, hammers and hatchets. It also is used for railroad ties, pallets, charcoal and smoking meat. The nuts, especially pecans, are prized for food.

**Black Walnut** A beautifully colored hardwood used for furniture, paneling, trim, doors, gunstocks and bowls.

Nut production is a booming business in Missouri. The wood of this tree is so popular that logs are even exported to foreign countries.

**White Ash** This strong hardwood is an athlete's special friend. It is used for baseball bats and hockey sticks, as well as furniture, cabinets and lumber.

**Basswood** This light, soft wood is used for carving toys, picture frames and wooden novelties.

**Baldcypress** Its heartwood is resistant to rot and decay. It is useful where wood is exposed to the weather such as siding, exterior trim, shingles, posts and pilings.

**Sugar Maple** A beautiful hardwood tree that is popular for its fall color. The wood is used for furniture, paneling, toys, bowling pins and musical instruments. Sugar maple is the source of maple syrup.

**Eastern Cottonwood** The wood is soft and lightweight. It is used for boxes and crates, lumber and pulp for paper.

**Flowering Dogwood** The wood of our state tree is hard, strong and tough for its weight. In the past, the wood has been used as shuttles for textile weaving and golf club heads.

Have students visit their library or resource media center to research tree products. Invite them to share with the class the information they found.

### BOOT IT UP

**You'll need:** *Habitactics* CD-ROM

This game is available from your school library or by contacting the Missouri Department of Conservation for information on how to obtain a copy of this game.

## LANGUAGE ARTS

### LOOKING AT THE LORAX

**You'll need:** The book or video of *The Lorax* by Theodore Geisel (Dr. Seuss)

Read to students *The Lorax* or show the video (see "Adventures in Reading," Resource page 50).

Ask students to list what they think the major ideas of the story are. Questions for discussion are listed below.

- Why do you think the Once-ler did what he did?
- What patterns of change in the environment did you observe?
- What were environmental conditions like before the company started making Thneeds?
- What were they like afterwards?
- What did the Once-ler mean by "UNLESS"?



- What responsibility does he think “someone like you” needs to take?
- Is it necessary to protect **all** trees from “axes that hack”?

### POETRY TIME

Have students recall all the information they have learned this week about trees. (You may want to write their responses on the board for the whole class to view.) Have students turn this information into poetic form. You may want to have your students choose from one of these formats:

**Acrostic:** The first letter in each line, when read vertically, spells out the name of something or conveys some other kind of information.

**Haiku:** A Japanese form of poetry that consists of three lines: the first line has five syllables, the second line has seven, and the third line has five again.

**Cinquain:** A poem that consists of five lines, each line has a set number of syllables: line 1 - the title in two syllables, line 2 - a description of the title in four syllables, line 3 - a description of action in six syllables, line 4 - a description of a feeling in eight syllables and line 5 - another word for the title in two syllables.

**Diamante:** A diamond-shaped poem that consists of seven lines that follow this pattern: line 1 - one noun, line 2 - two adjectives, line 3 - three participles, line 4 - four nouns, line 5 - three participles, line 6 - two adjectives, line 7 - one noun.

**Windspark:** A poem that has five lines with the following pattern: line 1 - “I dreamed,” line 2 - “I was . . .” (something or someone), line 3 - where, line 4 - an action, line 5 - how.

Samples of these different poetic forms can be found in the Resource Section of this guide on page 45. See Art activity “Illustrated Poetry” for an extension to this activity.

### MATH

#### THINKING THINGS OVER

Ask your students to solve these math problems.

There were nine wooden picnic tables made from oak trees in a recreation area. Two-thirds of them were newly painted. How many tables still needed to be painted? (Answer: three tables)

Two careless campers left camp without putting their fire completely out. A wind came up and started a forest fire which destroyed 98 acres of timber before it was put out. If the timber was worth \$125 per acre, what was the total loss? (Answer: \$12,250)

A carpenter wants 54 short boards of pine lumber cut in equal lengths. He can get six of them by sawing up a long board. How many long boards would he need for 54 short boards? (Answer: nine long boards)

The woods on Allen’s farm contained many sugar maple trees, which his father tapped for maple syrup. Besides what they used and gave to friends, his father sold 84 gallons at \$16 per gallon. How much money did he get for the maple syrup he sold? (Answer \$1,344)

### POUNDS AND POUNDS OF PAPER

**You’ll need:** a postage scale or other type of scale to weigh the paper contents of your students’ desks

How much paper do your students use in school? Have your students try this and find out the surprising results.

1. Each student weighs all the paper in their desk (books, notebooks, etc.) on the scale. Add each student’s total for a grand total.
2. Divide to find the average weight of paper per student.
3. Multiply the average weight by the number of students in the school. What is the grand total?
4. A 16-inch diameter tree yields 700 pounds of paper. How many trees did your school consume? Think about how much landfill space this paper will take when it is thrown away.
5. Brainstorm ways that the students and school can use less paper. Develop a plan of action to carry out some of the ideas the students have developed.

### SOCIAL STUDIES

#### TREES IN OUR CITIES

Introduce the term **urban forest**. Urban forests are everywhere we look. You can find them along city streets, in parks, in people’s yards, beside streams and just about everywhere. Not only do these trees provide shade and make our cities pleasing, but they also play a vital role in the health of our community.

They absorb carbon dioxide and give us oxygen to breathe. They also warn us about environmental pollution. Our urban forests protect local watersheds and improve the quality of our water supply. They provide homes for birds and other animals, cool us on a hot day, give us a place to build a tree house, tie our swings, a place to climb and give our communities seasonal changes in color.

As a group, identify urban forests within your own community. What benefits do those trees provide for your area? How do trees help create healthier air, soil, water and people?



## A COMMUNITY FRIEND

**You'll need:** to contact your local government offices (city hall, county courthouse, etc.) to arrange for a guest speaker to visit your school or for your class to take a field trip to visit them.

Have students ask the official their own questions and learn the answers to these questions:

1. What department is in charge of the trees in the community?
2. How much money does this department spend each year on tree care?
3. What are their main expenses?
4. Has the community planted any trees? Where do they get their planting stock?
5. How do they decide what species of trees to select for planting?
6. How many of the trees that they planted survived?
7. What are the biggest enemies to the trees in our community?
8. What can people do to help our trees stay healthy?
9. Does our community do anything to celebrate Arbor Day?

See Resource page 53 for information on different groups and organizations that support tree planting and care.

## MUSIC AND ART

### ILLUSTRATED POETRY

Have the students create a drawing to reinforce the theme of their poems. See if the students can illustrate around their poems, have their poems be part of the drawing or reflect the message in a way that the students are most comfortable.

### SONG FEST

Learn one of the songs from Resource Section of this guide.

## PHYSICAL EDUCATION

### NAME A PRODUCT

**You'll need:** rubber playground ball

This game is played like Call Ball. Each student is assigned a number. One student throws the ball straight up in the air over his or her head and calls out a number. The child with that number must yell out the name of a tree product before they catch the ball. If the child can't name a tree product, or fails to catch the ball, then the thrower throws again. If the child names a tree product and catches the ball, then he or she gets to throw the ball straight up in the air and call a number.

## PERFORMANCE ASSESSMENT

### TASK STATEMENT

Students will identify how humans and trees are interdependent.

### INDIVIDUAL ASSESSMENT

Have each student write a paragraph(s) finishing this statement: "If I were a tree I would ask you to ..." The focus should be on the things trees depend upon humans to do for them.

### GROUP ASSESSMENT

Divide the students into groups of two or three. Have one student in each group draw the shape of a tree. Direct each group to write inside the tree a list of products from trees that they use.

### RUBRIC

#### DAY 4 STANDARD

To demonstrate an understanding of how trees and humans are interdependent upon each other.

#### QUALITY OF PERFORMANCE

4 = Exceeds performance standard

3 = Meets performance standard

2 = Developing toward performance standard

1 = Many errors, does not meet standard



# Thinking Things Over



Name: \_\_\_\_\_

## Solve these math problems:

1. There were nine wooden picnic tables made from oak trees in a recreation area. Two-thirds of them were newly painted. How many tables still needed to be painted?

Answer: \_\_\_\_\_

2. Two careless campers left camp without putting their fire completely out. A wind came up and started a forest fire which destroyed 98 acres of timber before it was put out. If the timber was worth \$125 per acre, what was the total loss?

Answer: \_\_\_\_\_

3. A carpenter wants 54 short boards of pine lumber cut in equal lengths. He can get six of them by sawing up a long board. How many long boards would he need for 54 short boards?

Answer: \_\_\_\_\_

4. The woods on Allen's farm contained many sugar maple trees, which his father tapped for maple syrup. Besides what they used and gave to friends, his father sold 84 gallons at \$16 per gallon. How much money did he get for the maple syrup he sold?

Answer: \_\_\_\_\_



# Missouri Forest Products



Name: \_\_\_\_\_

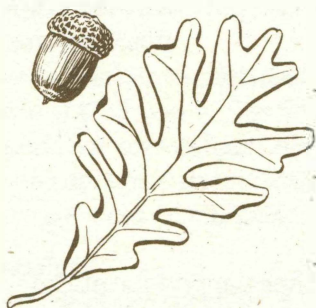
Listen as someone reads to you about Missouri forest products. List the products for each tree as you hear them. Then go back and draw pictures of these products.



Shortleaf Pine



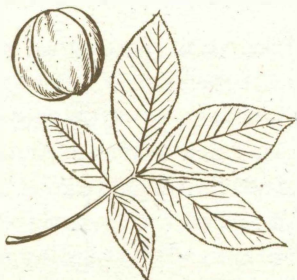
Eastern Redcedar



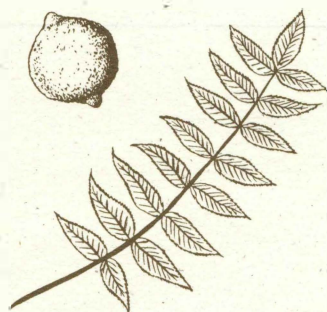
White Oak



Red Oak



Hickory



Black Walnut



# Missouri Forest Products



Name: \_\_\_\_\_

Listen as someone reads to you about Missouri forest products. List the products for each tree as you hear them. Then go back and draw pictures of these products.



White Ash

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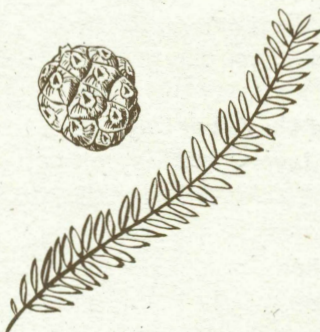


Basswood

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Baldcypress

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Sugar Maple

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Eastern Cottonwood

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Flowering Dogwood

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## Day 5 of Arbor Week

# ARBOR DAY CEREMONY



**Objectives:** To provide a format for an Arbor Day Ceremony on the first Friday in April and to have students actively participate in a program in which they show their desire to plant a tree to create a better environment.

**Vocabulary:** future, proclamation, stewardship

### ARBOR DAY CEREMONY

**You'll need:** copy of the Mayor's Proclamation, page 32, copies of students' Arbor Day Certificates, page 33.

This ceremony is meant to give you a framework for celebrating Arbor Day. The ceremony can be adapted to meet your needs but it should include an Arbor Day proclamation and the planting of one or more trees.

Ahead of time have students help prepare the planting site. The hole must be dug and water must be available before the ceremony. Be sure there are enough shovels for dignitaries.

Ask each child to bring a small amount of soil from home to deposit in the hole during planting. Another fun idea would be to place a small glass bottle containing a list of the members of the class and the participating teachers among the roots of the tree when it is planted to create a "time capsule" recognizing the people involved.

#### The Future

Looking to the **future** is what Arbor Day is all about. By planting these seedlings we are ensuring a future that is productive, healthy and beautiful. Today, as they plant these seedlings, students are giving root to their love for trees and their **stewardship** of our environment. The activities of this Arbor Week have taught students about trees and will help them plant a future not only for themselves, but also for generations to follow.

Remember this is an Arbor Day Celebration, so make it fun. Singing, reading poems, entertainment and refreshments all lend to a festive celebration.

### ORDER OF EVENTS FOR AN ARBOR DAY CEREMONY

1. **Song** such as the National Anthem, America the Beautiful, This Land is Your Land or one of the songs from the Resource Section of this book.
2. **Welcome** by Mayor, civic official or principal.
3. **Brief history of Arbor Day.** You may want to use the "History of Arbor Day" provided on page 3.
4. **Poems or readings about Arbor Day.** You may want the students use the poems or stories they wrote during Arbor Week, or you may use any of the poems in the Resource Section of this guide.
5. **Reading and signing of the Arbor Day Proclamation by the Mayor.** If the Mayor is not present, you may choose a civic official or the principal to read the proclamation.
6. **Planting a tree together.** Students file by and deposit their soil samples into the hole. Place the bottle with names of students and teachers in the root area.
7. **Completion of planting and distribution of seedlings** to students with instructions for planting at home and a demonstration on how to properly water and care for their new tree.
8. **Refreshments** and other entertainment.

### DETAILS TO REMEMBER

1. **Make plans for inclement weather.**
2. **Printed programs** help the ceremony to move on schedule.
3. **A young tree needs special care, especially just after it has been planted.** The class could "adopt" the tree, taking turns throughout the summer and following year watering the tree once a week or so



when there is no rain. This will impress upon students that trees must be cared for if we want to successfully renew this important resource within our community.

4. **Media coverage.** Invite local newspapers and radio, and television stations to participate in your Arbor Day Celebration. Provide write-ups for media at the ceremony and be available to answer questions.
5. **Other aids?** Perhaps you will need a public address system so speakers can be heard, a lectern or the U.S. or Missouri flags.
6. **Rehearse the details.** A day or two before the ceremony have a rehearsal with your students to make sure they know what they are supposed to do and when they are to do it.
7. **Refreshments.** Organize this ahead of time and line up your helpers, servers and clean-up crew.

## NATIVE MISSOURI TREES

### DECIDUOUS TREES

Black Willow  
Ward's Willow  
Peachleaf Willow  
Sandbar Willow  
Eastern Cottonwood  
Swamp Cottonwood  
Black Walnut  
Butternut  
Pecan  
Shagbark Hickory  
Shellbark Hickory  
Mockernut Hickory  
Pignut Hickory  
Black Hickory  
Bitternut Hickory  
Water Hickory  
American Hazel  
Eastern Hophornbeam  
American Hornbeam  
River Birch  
American Beech  
Hazel Alder  
Ozark Chinkapin  
White Oak  
Bur Oak  
Post Oak  
Overcup Oak  
Swamp White Oak

Chinkapin Oak  
Swamp Chestnut Oak  
Northern Red Oak  
Pin Oak  
Scarlet Oak  
Shumard Oak  
Black Oak  
Southern Red Oak  
Cherrybark Oak  
Blackjack Oak  
Water Oak  
Shingle Oak  
Willow Oak  
American Elm  
Slippery Elm  
Rock Elm  
Winged Elm  
Hackberry  
Sugarberry  
Planertree  
Red Mulberry  
Osage-orange  
Yellow-poplar  
Cucumber tree  
Pawpaw  
Sassafras  
Spicebush  
Witchhazel  
Sweetgum  
American Sycamore  
Downy Serviceberry

Prairie Crab Apple  
Hawthorn  
American Plum  
Black Cherry  
Kentucky Coffeetree  
Honeylocust  
Waterlocust  
Eastern Redbud  
Yellowwood  
Black Locust  
Common Prickly-Ash  
Common Hoptree  
Smooth Sumac  
Shining Sumac  
Smoketree  
American Holly  
Deciduous Holly  
Eastern Wahoo  
American Bladdernut  
Sugar Maple  
Black Maple  
Silver Maple  
Red Maple  
Boxelder  
Ohio Buckeye  
Red Buckeye  
Western Soapberry  
Carolina Buckthorn  
American Basswood  
Devils Walkingstick  
Blackgum  
Water Tupelo  
Flowering Dogwood  
Roughleaf Dogwood  
Gray Dogwood  
Gum Bumelia  
Persimmon  
White Ash  
Green Ash  
Blue Ash  
Pumpkin Ash  
Fringetree  
Northern Catalpa  
Blackhaw  
Rusty Blackhaw

### EVERGREEN TREES

Ashe Juniper  
Baldcypress  
Eastern Redcedar  
Shortleaf Pine



# Arbor Day Proclamation

*Whereas,* In 1872, J. Sterling Morton proposed to the Nebraska Board of Agriculture that a special day be set aside for the planting of trees, and

*Whereas,* this holiday, called Arbor Day, was first observed with the planting of more than a million trees in Nebraska, and

*Whereas,* Arbor Day is now observed throughout the nation and the world, and

*Whereas,* trees can reduce the erosion of our precious topsoil by wind and water, cut heating and cooling costs, moderate the temperature, clean the air, produce oxygen and provide habitat for wildlife, and

*Whereas,* trees are a renewable resource giving us paper, wood for our homes, fuel for our fires and countless other wood products, and

*Whereas,* trees in our city increase property values, enhance the economic vitality of business areas and beautify our community, and

*Whereas,* trees, wherever they are planted, are a source of joy and spiritual renewable,

NOW, THEREFORE, I, \_\_\_\_\_, Mayor of the City of \_\_\_\_\_, do hereby proclaim \_\_\_\_\_ as

## Arbor Day

In the City of \_\_\_\_\_, and I urge all citizens to celebrate Arbor Day, and to support efforts to protect our trees and woodlands, and

*Further,* I urge all citizens to plant trees to gladden the heart and promote the well-being of this and future generations.

*Dated* This \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_

\_\_\_\_\_  
Mayor





# *Certificate of Participation*

*Special recognition is hereby given to*

---

*for meritorious contributions to Arbor Week activities*  
*this* \_\_\_\_\_ *day of* \_\_\_\_\_, \_\_\_\_\_.

*Missouri Department of Conservation*

\_\_\_\_\_  
*Teacher*



# Resource Section

## ADDITIONAL ACTIVITIES

Trees provide interesting learning opportunities throughout the entire year. Listed below are some activities that you can use throughout different seasons of the year.

### ADOPTING A TREE FOR THE SCHOOL YEAR

**You'll need:** scrapbooks for each student

Beginning in the fall have each student make a scrapbook for their adopted tree. Have them make a title for their scrapbook and every time they complete a drawing or project they can add it to their book.

In the fall take students to an area where there are trees. Have each student or group of students adopt a particular tree that they will observe throughout the entire year. Have them observe their tree closely. As they visit their adopted tree throughout the different seasons, have them draw a picture of their tree during each season.

#### Autumn visits:

- Have students become familiar with their tree. Carefully look at the tree and notice the texture of the bark. Have them do a bark rubbing.
- Look for signs that insects, animals or humans may have left on the tree. Are these helping or harming the tree? Include these on their drawings of the tree.
- Is there pollution around the tree?
- What type of leaves or needles does the tree have?
- Why do leaves change color in the fall? (*The chlorophyll disappears from the leaves. When this happens the red, yellow and orange pigments begin to show through.*)
- Why do leaves fall off trees in autumn? (*When leaves are not producing food, they dry up and loose their hold on branches. The wind blows them off the tree.*)
- Look for seeds from their tree. Draw a picture of the seed and add this to their scrapbook. Did different students find different seeds? How are they alike and how are they different?

#### Winter visits:

- How much time has passed between fall color change and the time the tree is bare?
- Sketch the tree as it is now. Be sure to look for any new signs of humans or animals.
- Is there pollution around the tree? Dispose of human-made pollution.
- Has the tree stopped growing? (*Trees "rest" or "sleep" during the winter but they never stop growing until they die.*)

- Have all the trees lost their leaves?
- Why are evergreen trees still green? (*They have a thick, protective wax that keeps them from losing water during the winter. They do lose their old needles when new ones grow.*)
- Are there any animal tracks around the tree? If so, draw a picture of what you see.

#### Spring visits:

- Have students observe changes in trees since their last visit. Record these changes.
- Sketch the tree as it is now. Be sure to look for any new signs of humans, animals or insects. Is there any sign of pollution?
- What new signs do you see that the tree is waking up?
- Does the tree have buds? What makes the buds begin to grow? (*Now that daylight time is increasing, more sunlight is available for trees.*) Warming temperatures allow for movement of water within the tree.
- What part of the tree makes the food? (*Leaves make food for the tree. They use air, water and sunlight during the process of photosynthesis.*)
- How does water get to the leaves? (*It travels through tube-like cells in the roots, trunk and branches of the trees.*)

#### Summer visits:

- Have students observe changes in trees since their last visit. Record these changes.
- Sketch the tree as it is now. Be sure to look for any new signs of humans, animals and insects. Are there any signs of pollution?
- Are there any nests in the tree? Why does the tree make a good nesting sight?
- How have the leaves changed since your spring visit? Record these changes. Draw a picture of what the leaves look like now.
- Look at the leaves on the tree. Are there more leaves on one side of the tree than on the other side? Why? (*The tree may get more sunlight on one side. Have the student observe what is near the side that has fewer leaves.*)
- How does the temperature under the tree feel as compared to the temperature in the sun? Take a temperature reading under the tree and in the sun. Be sure to shade the bulb of the thermometer while in the sun. Record the differences in temperatures.

#### LEAF FRIEND

- Collect a variety of leaves from outside near your school (use only those that you find on the ground). Give each of the students a leaf and ask them to look at their new leaf friend. They may even want to give it a name! After



one minute of getting acquainted with their leaf friend, collect the leaves and put them in a pile on a table. Stir up the pile of leaves. Have students come up and try to find their leaf from the group of leaves on the table. Discuss the characteristics that helped them recognize their leaf. Were all the leaves from the same tree? Compare our own special characteristics, how we have our own family trees (lineage) and how different types of trees can live in the same area if the area provides the essentials for survival (diversity and multiculturalism).

### LEAF MATH

Have students measure the length and width of their leaf in centimeters and inches. You may want students to estimate or use fractions or decimals in recording their answers. Chart or graph their answers to do a comparison of leaf types and sizes.

Take students outside and try to match their leaf to the tree from which it came. Have students measure the circumference of the tree and estimate the height of the tree.

### LEAF CREATURES

Have students collect leaves, rocks, bark, seeds and other items found on the ground. Have students create imaginary leaf creatures, and write a story about them.

### LEAF PICKUP RELAYS

Have one leaf for each student. Line students up in relay lines. The first person in each line is to collect all of his or her teammate's leaves and place them in a pile at the designated relay line. Place a basket, bucket or a similar container halfway between the relay lines and the pile of leaves. The first person in each line races down and picks up a leaf and races back to the container, deposits the leaf in the container and runs back to their line. Repeat until all the children in a line have picked up all their leaves and the last person has returned to his or her line.

### AMERICAN INDIANS AND SETTLERS

Discuss and compare how the American Indians and the early settlers of Missouri used the forests and trees. Look at how we use our forests and trees today. In what way are our uses alike and different?

### NATURE'S AIR CONDITIONERS

**You'll need:** plastic bags, tie bands and a small pebble for each bag

Give each student or group of students a plastic bag. Have them insert a pebble into each bag and then tie the bag around a leaf on a tree. The bag should be secured tightly on the stem of a twig to which the leaf is attached and left in place for 24 hours.

Discuss transpiration with your students, which is the plant process where water vapor is evaporated from the leaves. Have the students observe the condensation of moisture on the inside of the plastic bag. After 24 hours, the students should remove the bags carefully so none of the water is spilled. Have them measure the volume of water transpired from the trees.

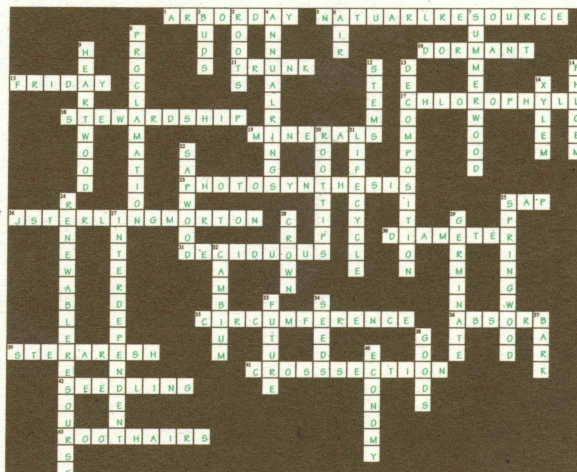
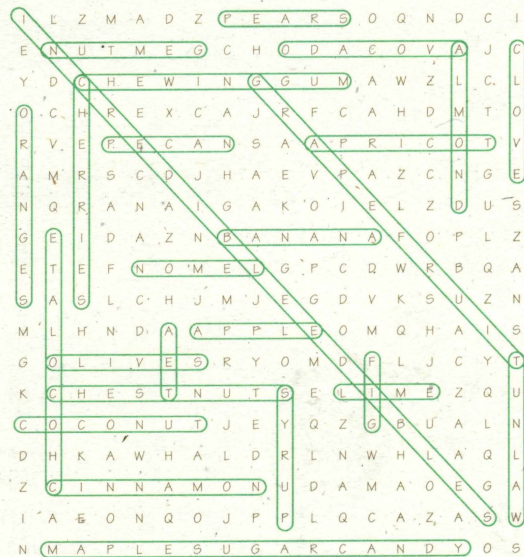
Questions for discussion:

- How much water did the leaf transpire in 24 hours?
- Count the number of leaves on a small tree. How much water do you estimate was evaporated by the entire tree?
- How might a tree's transpiration affect the temperatures and humidity in a forest?

Adapted from *Project Learning Tree*

### Answers:

ALMOND	APPLE	APRICOT	AVOCADO	BANANA	CHERRIES
CHESTNUTS	CHEWING GUM	CHOCOLATE	CINNAMON	CLOVES	COCONUT
FIG	GRAPEFRUIT	LEMON	LIME	INCREDIBLE EDIBLES	
NUTMEG	OLIVES	ORANGES	PEARS	MAPLE SUGAR CANDY	
PECANS	SYRUP	TEA	WALNUT		





# Where Are the Incredible Edibles?



Trees produce many of the foods that we often enjoy. How many incredible edibles can you find in this puzzle? Names are up, down, diagonal and backwards. Can you find all 26 of these incredible edible words?

ALMOND	APPLE	APRICOT	AVOCADO	BANANA	CHERRIES
CHESTNUTS	CHEWING GUM	CHOCOLATE	CINNAMON	CLOVES	COCONUT
FIG	GRAPEFRUIT	LEMON	LIME	INCREDIBLE EDIBLES	
NUTMEG	OLIVES	ORANGES	PEARS	MAPLE SUGAR CANDY	
PECANS	SYRUP	TEA	WALNUT		

I	L	Z	M	A	D	Z	P	E	A	R	S	O	Q	N	D	C	I
E	N	U	T	M	E	G	C	H	O	D	A	C	O	V	A	J	C
Y	D	C	H	E	W	I	N	G	G	U	M	A	W	Z	L	C	L
O	C	H	R	E	X	C	A	J	R	F	C	A	H	D	M	T	O
R	V	E	P	E	C	A	N	S	A	A	P	R	I	C	O	T	V
A	M	R	S	C	D	J	H	A	E	V	P	A	Z	C	N	G	E
N	Q	R	A	N	A	I	G	A	K	O	I	E	L	Z	D	U	S
G	E	I	D	A	Z	N	B	A	N	A	N	A	F	O	P	L	Z
E	T	E	F	N	O	M	E	L	G	P	C	D	W	R	B	Q	A
S	A	S	L	C	H	J	M	J	E	G	D	V	K	S	U	Z	N
M	L	H	N	D	A	A	P	P	L	E	O	M	Q	H	A	I	S
G	O	L	I	V	E	S	R	Y	O	M	D	F	L	J	C	Y	T
K	C	H	E	S	T	N	U	T	S	E	L	I	M	E	Z	Q	U
C	O	C	O	N	U	T	J	E	Y	Q	Z	G	B	U	A	L	N
D	H	K	A	W	H	A	L	D	R	L	N	W	H	L	A	Q	L
Z	C	I	N	N	A	M	O	N	U	D	A	M	A	O	E	G	A
I	A	E	O	N	Q	O	J	P	P	L	Q	C	A	Z	A	S	W
N	M	A	P	L	E	S	U	G	A	R	C	A	N	D	Y	O	S



# Forest Facts Crossword



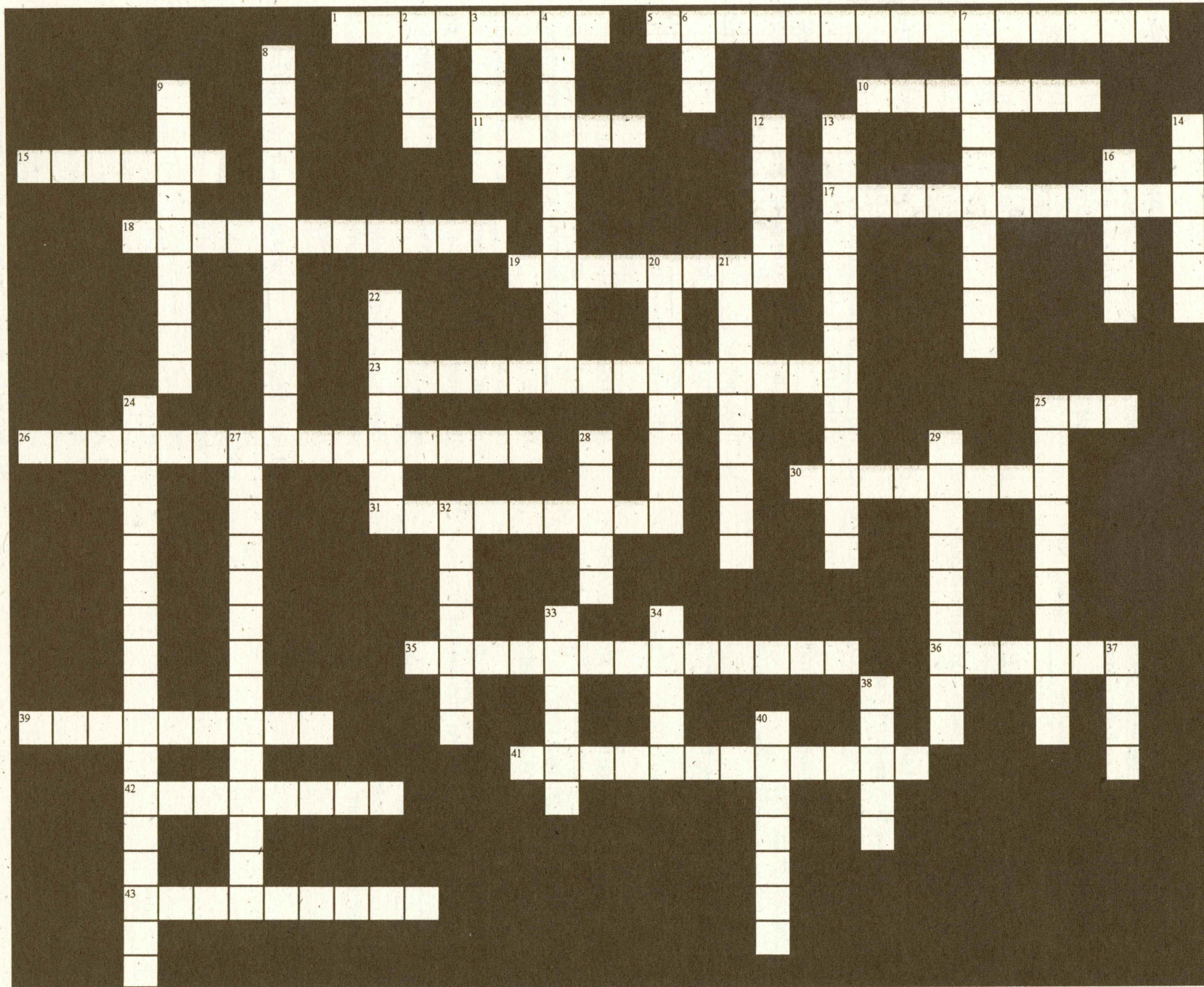
## ACROSS

1. "Other holidays repose upon the past. \_\_\_\_\_ proposes for the future."
5. Something that lies ready for use and is supplied by nature is called a \_\_\_\_\_.
10. Seeds and roots are "asleep" or \_\_\_\_\_ during the winter.
11. The tree's \_\_\_\_\_ consists of four layers.
15. Arbor Day is the first \_\_\_\_\_ in April.
17. The \_\_\_\_\_ in the leaves makes food from sunlight, carbon dioxide and water.
18. \_\_\_\_\_ is the act of taking care of our environment.
19. Roots grow as they search for air, water and \_\_\_\_\_.
23. The process of using the sun's energy to make food is called \_\_\_\_\_.
25. The phloem vessels move \_\_\_\_\_ from the leaves to the rest of the tree.
26. Arbor Day originated from a vision of the future by \_\_\_\_\_.
30. A straight line passing through the center of a circle is called the \_\_\_\_\_.
31. Each year at a certain time, \_\_\_\_\_ trees lose all their leaves.
35. \_\_\_\_\_ is the distance measured around a circle.
36. Tiny roots \_\_\_\_\_ approximately 95% of the water and minerals needed by a tree.
39. Shortleaf pine and redcedar are types of \_\_\_\_\_ trees.
41. Each year a tree adds a new layer of wood to its trunk. We see this as a ring when we look at a slice or \_\_\_\_\_ of the tree.
42. A \_\_\_\_\_ is a small tree that has grown from a seed.
43. \_\_\_\_\_ absorb the majority of the tree's water and minerals.

## DOWN

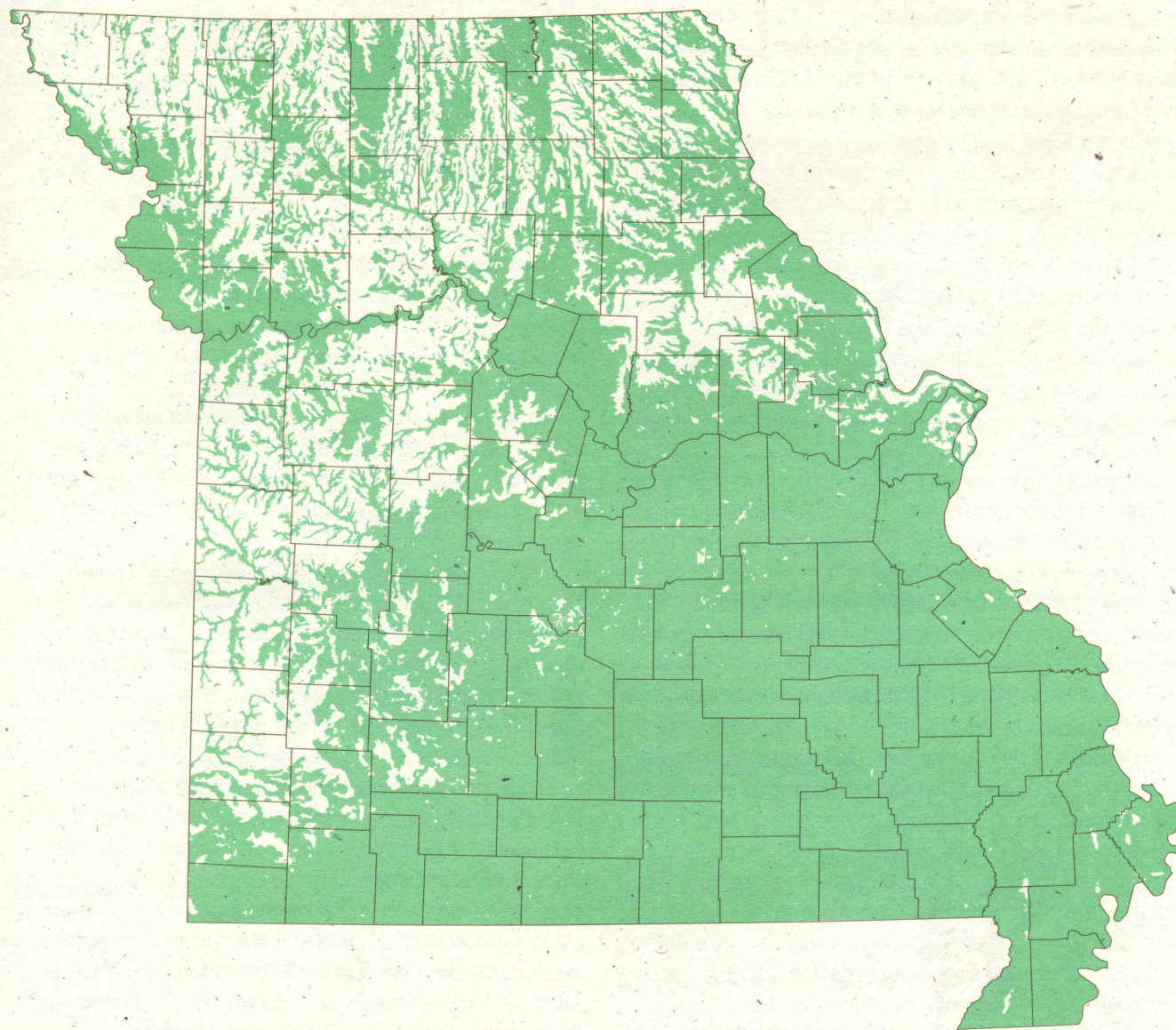
2. As the \_\_\_\_\_ on the twigs expand, the tree grows taller and wider.
3. The \_\_\_\_\_ are underground and often spread as wide as twice the height of the tree.
4. By counting the \_\_\_\_\_, it is possible to tell the age of a tree.
6. Roots grow as they search for \_\_\_\_\_, water and minerals.
7. In annual rings, the \_\_\_\_\_ is darker than the springwood.
8. The Governor signs a \_\_\_\_\_ each year declaring the first Friday in April as Arbor Day.
9. The \_\_\_\_\_ is the dead, woody tissue in the center of the tree.
12. The \_\_\_\_\_ of trees hold up the branches and leaves.
13. \_\_\_\_\_ is the process which returns nutrients to the soil.
14. Trees produce \_\_\_\_\_ vessels to move sap from the leaves to the roots and other leaves.
16. Trees produce \_\_\_\_\_ cells to bring water and nutrients up from the roots to the leaves.
20. The \_\_\_\_\_ cause the roots to grow long and spread out in search of water and nutrients.
21. One way to learn about trees is to explore their \_\_\_\_\_ from germination to decomposition.
22. Xylem is also called \_\_\_\_\_.
24. Forests are a \_\_\_\_\_, which means they won't "run out" if they are properly managed.
25. The lighter colored part of an annual ring is called the \_\_\_\_\_ because it is produced early in the growing season.
27. There is a close relationship between soil, trees, wildlife and humans. Each is \_\_\_\_\_ upon the others.
28. Trees have three main parts — the roots, the trunk and the \_\_\_\_\_.
29. For a seed to \_\_\_\_\_ and grow, environmental conditions must be just right.
32. Just inside a tree's bark is the growing region of the tree called \_\_\_\_\_. It produces the phloem and xylem cells.
33. By being good stewards of our forests, we are ensuring that there will be forests in the \_\_\_\_\_.
34. Acorns and walnuts are types of \_\_\_\_\_.
37. A tree's \_\_\_\_\_ helps protect it from insects and diseases.
38. Trees give us \_\_\_\_\_ which can be sold.
40. Products made from trees which can be sold are important to our state's \_\_\_\_\_.







## MISSOURI'S FORESTS, YESTERDAY



**E**arly explorers of the Missouri territory found a blend of landscapes rich with the essentials of frontier life — wood, water and wildlife. Forests covered 70 percent of the state with an astonishing variety of tree species. Explorers wrote of the dark swamps of the Bootheel, the park-like pine forests of the Ozarks, the balds of south-west Missouri and the mix of prairie and forest in north and west Missouri.

It is difficult to recall, when driving through the Missouri Ozarks today, exactly how these forested hills looked in the 1930s. Oldtimers searching their memories remember especially two things: rocks and broom sedge. The hillsides were white with exposed rock, among which a few scraggly trees stood. These surroundings were symbols of a century of abuse, and they were everywhere.

Historical writings tell of majestic forests open enough beneath the towering trees to drive a buggy through them. In 1857 Father John Joseph Hogan, trying to locate some land in the eastern Ozarks where Irish immigrants might settle, rode horseback without too much difficulty from south of Ironton to the area that is now Carter and Oregon Counties. The area where that settlement started is now called the Irish Wilderness.

Not all of the Ozarks grew large trees or had abundant wildlife. Henry Rowe Schoolcraft wrote of journeying across the Ozarks from Potosi to the White River country in 1818. He found large expanses of oak brushlands where he nearly starved as he tried to live off the land. Usually these brushlands were on soils underlaid with a clay pan that prevented trees from attaining much



growth. They are not productive forest lands even today. In general, the heavily forested areas of the Ozarks were the hillsides and bottom lands.

The central Ozarks were among the last land areas to be settled. The hardy pioneers of the 1850s were subsistence farming along the rivers, and trapping and hunting to eke out a living.

Exploitation of the timber in some of the Ozarks next to the larger streams, such as the Gasconade, began as early as 1818. The word "harvest," which we use now, is too dignified to describe the cut-and-get-out operation of the lumber industry at the turn of the century. Timber was cut and floated down the Gasconade to the Missouri River to St. Louis. Cords of fuelwood were in demand to supply the now popular steam-driven riverboats. By 1852 the Osage and Gasconade River Valleys were cut over.

Timber cutting in the mid-1800s was two-thirds pine and only one-third hardwoods. By 1909, this had shifted to 73 percent hardwoods, as the major pine woods already had been cut.

It wasn't until the late 1800s, with the coming of railroads, that lumbermen began exploiting the deep Ozark forests. In the post-Civil War years, a war-torn nation needed lumber to rebuild. The expansion of railroads after the Civil War also created a demand for both fuel and ties. Lumbermen cut the better hardwoods and a major part of the pine, extending railways back into the hills and floating great rafts of logs out of the hills on the rivers.

The sawmill at Grandin, in Carter County, was said to be the largest lumber mill in the state — possibly in the nation — in 1887. The mill at Grandin needed the logs from 70 acres of forest each day to keep it running. The rivers also were used for transportation. Large log drives were made on the Current, Jacks Fork and Black rivers. Farmers could make a little money by "hacking" or chopping railroad ties out of logs — a lot of work for the grand sum of 10 cents a tie. Other large sawmills operated in Winona, West Eminence, Bunker, Leeper, Greenville, Poplar Bluff, Doniphan and Birch Tree. The far reaches of the hollows sheltered hundreds of other small saw mills. At the turn of the 20th century, the Missouri Ozarks comprised one of the largest timber producing regions in the nation.

By 1920, the forests that no one thought would run out, did. When the great mills closed down, the areas were left with people who, struggling to make a living, further impoverished the land. They cleared the ridgetops, trying to grow a few crops. Free-ranging livestock roamed the woods to forage on acorns and sprouts. Settlers burned the cut-over woods each spring. They mistakenly believed that fire killed the ticks and snakes and made the grass grow. All these factors had a major effect on Ozark soils, streams and wildlife.

Elsewhere in Missouri, the forests had a different, but just as devastating, history. Around settlements, forests were cut off for homes, fences and firewood. Missouri's last forest area to be cut was the great swampland of Southeast Missouri.

No record of any thought toward managing Missouri forests was evidenced until 1925. By the 1930s only about 2,000 deer were thought to exist in the state, and turkeys declined to a few thousand birds in scattered flocks.

In 1937, forestry was included with wildlife and fish in the constitutional amendment that established the Conservation Commission. It was recognized that any attempt to restore wildlife in the state was, to a large extent, dependent upon how the woodlands were managed. Thus, the seeds of a new era for forestry in Missouri were sown.

The abused land common at the turn of the century has drastically changed with the establishment of the Conservation Commission and, ultimately, the Missouri Department of Conservation. Now the Ozark hills are covered with trees and the streams again run steady and clear. So successful have been the forestry programs created by the Missouri Department of Conservation, that "wilderness" has been created out of once nearly barren hills. Anyone who can remember what the Irish Wilderness looked like in the 1930s will smile at calling this a wilderness. Its "pristine" look today is the result of hard work in stopping fires, upgrading existing timber, and improving forest management practices.

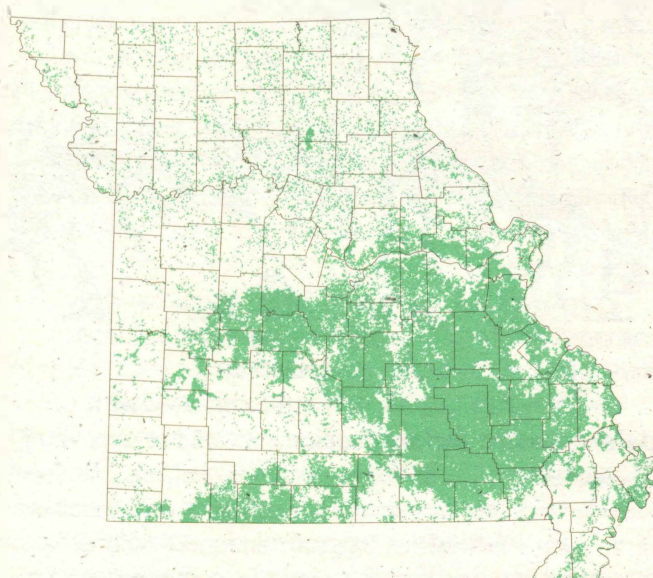
*Adapted from The First 50 Years, by the Missouri Department of Conservation*



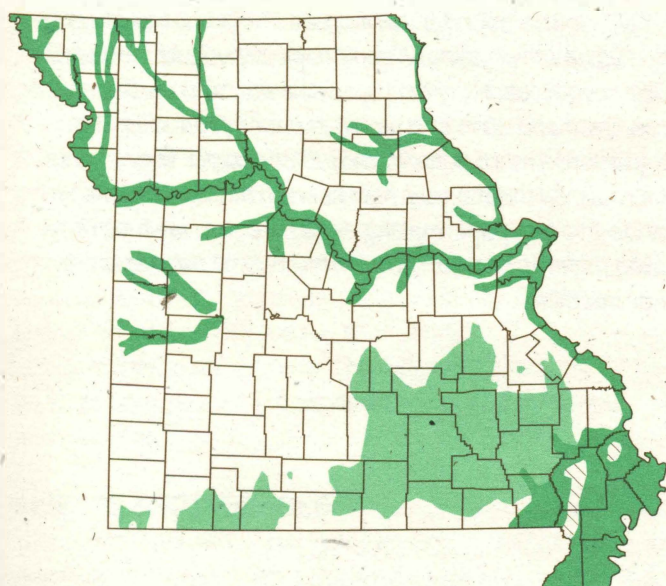
## MISSOURI'S FORESTS, TODAY

Missouri's forest and wildlife resources have made a remarkable recovery from the ravages of the early 20th century. Forest fire control, harvesting of defective trees and reforestation all have resulted in the quality forests Missourians now enjoy. Today about 14 million acres of the state are covered with forests, a gain of more than one million forested acres in the last 20 years.

### PRESENT FOREST COVER



### FOREST TYPES



Adapted from Missouri Forests

July 1996

## FOREST TYPES

Missouri lies on the western edge of the Central Hardwood Region. This region covers about 100 million acres, stretching from Missouri to Pennsylvania and from Tennessee to the Lake States. Four broad forest types or associations occur in Missouri (see map).

**Oak-Hickory** This upland association covers the greatest area in Missouri. Oaks dominate, with white, black, scarlet and northern red oak being the most common. Post and blackjack oak occur often on drier areas. Less common are southern red, chinkapin, bur and pin oak. Hickory is a minor but consistent part of the forest.

Many animals range broadly throughout this community. Mammals include black bear, fox, white-tailed deer, raccoon, opossum, squirrel and chipmunks. Prevalent birds are wild turkey, screech owl, pileated woodpecker, summer tanager, oven bird and Kentucky warbler to name a few.

**Oak-Pine** This upland type occurs on the drier sites in the southern and southeastern Ozarks. It is very similar to the oak-hickory type except that shortleaf pine makes up 25 to 50 percent of the stand. The remainder is primarily oaks, but other hardwoods associated with oak-hickory also may be present. Mammals present are similar to those found in the Oak-Hickory association.

**Mixed Hardwoods** This association appears in one small area known as Crowley's Ridge in southeastern Missouri. Mixed hardwood forests are remnants from the geologic period when the Ozarks and Appalachians were one mountain chain. The principal species are yellow-poplar, sweetgum, white oak, northern red oak, American beech and sugar maple. Mammals present are similar to those found in the Oak-Hickory association.

**Bottomland Hardwoods** This type occurs in the Bootheel of southeast Missouri and on the flood plains adjacent to rivers and streams. The land it occupies may be covered with standing water for long periods, as in the swamps of the Bootheel, or it may be subject to only short periods of flooding.

A great number of plant species make up this forest. Important trees in river flood plains include pin and bur oak, cottonwood, elm, ash, willow, river birch, silver maple and sycamore. In addition baldcypress, water tupelo, and Nuttall, willow, cherrybark, overcup, swamp chestnut and water oak are native only to the lowlands of the Bootheel.

Mammals of bottomland forests include beaver, muskrat, flying squirrel and, in the Lowlands Section, the swamp rabbit and cotton mouse.



## TO CUT OR NOT TO CUT?



**Natural resources** are the raw materials we use for housing, clothing, transportation, heating, cooking, etc. They include the air we breathe, the water we drink, the land we farm and the space we use for living and recreation. In short, they are all the things we use in our physical environment to meet our needs and wants. We can put natural resources into three categories: **perpetual**, **nonrenewable** and **renewable**.

In a human time frame, **perpetual** resources such as solar energy, wind and tides last forever. **Nonrenewable resources**, however, exist in fixed amounts and once they're used up, they're gone forever. For example, fossil fuels are formed through natural processes that take millions of years. If we use all the available fossil fuels, no additional amounts of them will be available to us — at least not for millions of years.

**Renewable resources** are materials that can be replenished through natural and/or human processes. For example, although trees die naturally or are harvested, new trees are naturally reseeded or can be replanted.

Wood provides a myriad of essentials for everyday life. Pencils, paper, furniture, lumber to build our house, firewood to heat our homes, medicines, charcoal, fruits and nuts are just a few of the more than 5,000 products that people get from trees. In the United States, nearly 80 percent of the materials for home construction are wood-based. Every man, woman and child uses more than 2,000 pounds of wood products per year. This is approximately the equivalent of a tree 16 inches in diameter and 100 feet tall.

This demand can be met because trees are a **renewable resource**. Through wise and careful management of our forests, they will continue to grow and supply products.

We are not running out of trees. Our forest land base has been stable since 1920 and has grown considerably since the mid-19th century. Old farm fields have returned to forest cover and forest fires which had previously burned unchecked, now burn less than one-tenth of 1 percent of the state. Fourteen million acres — or 31 percent of the state — is covered by forests. In addition, annual growth of the forest far exceeds the amount harvested.

**Conservation**, or wise use, has made all this possible. Each forest owner has a different goal for managing his or her land, but most have one thing in common: they want to manage their forests in an aesthetically pleasing and ecologically sound way, while growing trees for forest products. Since 85 percent of Missouri's forest land is owned by private individuals, this often means that your neighbor is helping to provide many of the products you use every day.

To achieve their goals, landowners must carefully manage their forest. Careful management includes harvesting, thinning and tree planting.

Timber harvesting should not be confused with **deforestation**. **Deforestation** involves the removal of all vegetation (trees, shrubs, ground cover, etc.) and converting that site to a nonforest use such as agriculture or housing subdivisions. Tropical rain forest deforestation is a global concern, but should not be confused with timber harvesting common in Missouri. The goal of timber harvesting is to use this renewable resource, but to maintain the site as a forest indefinitely.

Missouri's abundance of trees should not blind us to the value of recycling. When people recycle or re-use natural resources, they decrease the demand on the resource and save energy. With paper products, the equation is more complicated. Since paper fiber cannot be recycled indefinitely, new fibers from trees must be added to the papermaking cycle. The real value to recycling paper is not to "save trees," but to save space in our landfills.



## THREATS TO HEALTHY FORESTS



There are many factors in the environment which may stress trees. Wildfires, wind, ice, lightning, pollution, diseases, insects, machines, vehicles, animals and abuse from people all take their toll. Damage caused by weather can't be prevented. With good care and management, however, trees can continue to be renewable natural resources.

Trees give us many things including fuel, lumber, wood pulp, fiber and food for both humans and animals. Trees are an essential part of the earth's environment because they absorb carbon dioxide, give off oxygen, hold water and soil in place and return nutrients to the soil.

Forests, plants, wildlife, soil and humans are interdependent. It is our job to conserve and manage the forests of the world for tomorrow rather than using them all today. Proper management of a forest includes planting, growing and harvesting trees to provide for erosion control, guard watersheds, protect animals, and provide for recreation. Each of us has a responsibility to do what we can to be good stewards of our trees to ensure there are forests for the future.

Listed below are some of the natural causes of damage to trees, as well as damage caused by people and machines.

### INSECTS AND DISEASES

There are hundreds of naturally occurring insects and diseases in a forest. While some of them may be harmful, most are not and some are even beneficial. Many insects and decay fungi help break down fallen leaves and woody material and return nutrients to the soil.

These insects and diseases are an important part of healthy forests. While they influence all aspects of forests, individual outbreaks usually have little long-term negative effect. Defoliation of one species may result in slower growth and even some mortality, but other species may respond with increased growth and regeneration. Animals that feed on insects may thrive on the abundant food during outbreaks.

Missouri forests have evolved with the naturally occurring insects and diseases over thousands of years. Natural control mechanisms usually keep pest populations under control without human intervention. However, pests introduced from other countries, who have no natural controls, cause the most damage to our forests.

Dutch elm disease is one example of such a disease. Introduced from Europe, Dutch elm disease is deadly to the American elm. In fact, it is the most destructive shade tree disease in North America. Virtually all American elms in the 41 states that have reported the disease have been eliminated.

Dutch elm disease is caused by a fungus that is carried by European elm bark beetles. The fungus and the elm bark beetles were brought to the United States in an infected shipment of logs from Europe. The logs arrived in Massachusetts in the early 1930s and were shipped to factories in New York, Ohio and Indiana. The bark beetles escaped from the logs as they traveled and carried the fungus with them. Once in the country, Dutch elm disease spread rapidly.

Chestnut blight and gypsy moth are other examples of introduced pests. Chestnut blight has killed virtually all the chestnut trees in the United States. Gypsy moth was also introduced into the eastern United States and is spreading west. It will be especially devastating to Missouri forests because oak leaves are the gypsy moth's favorite food.

It is difficult to know how to control these pests. Some people use chemicals. Chemicals, however, can cause other damage to nontarget insects and animals. If not properly applied, they may cause damage to the environment or to the person applying the chemical. Others try to combat damaging bugs with other bugs. The good insects like to eat the damaging insects. This type of control is more difficult, but sometimes has a longer lasting effect.

Getting rid of harmful pests is important, but it has to be done with care. All insects and diseases, even those that attack plants, have a unique place in the ecosystem. The best protection for trees is to keep them healthy and growing. Like humans, a healthy tree can usually defend itself against diseases.



## FIRE

Fire is a natural event in most forest ecosystems. Some forests depend on fire to recycle nutrients back into the soil. Some trees depend on the heat of fire to open their cones and release seeds. Other trees, like shortleaf pine, need fire to bare the soil for germinating seeds and to open the forest canopy to provide warmth and sunlight.

Fire occurs naturally through lightning strikes in the presence of dry fuel. However, less than 1 percent of Missouri's wildfires are due to natural causes. Most Missouri fires occur when humans start them intentionally or accidentally. In fact, careless trash burners accidentally start 50 percent and arsonists set 40 percent of the wildfires in the state.

Prescribed fire can be a useful forest management tool when used properly. Prescribed fire is only used for specific sites and conditions, and should not be confused with wildfires set by arsonists. Setting wildfires, at least for some individuals, is a game played to harass landowners and conservation authorities. A neighborhood feud sometimes results in a fire. A few people out for a good time and a little excitement often set fires "just for the fun of it."

When a fire is ignited and allowed to rage out of control, the forest ecosystem often is hurt. Fire then becomes a tree enemy. If a forest is very dry, hundreds of acres can burn in a short time. Raging forest fires can destroy valuable wildlife habitat, damage trees and threaten lives and property. Once they start, forest fires are hard to control. Firefighters battle them with bulldozers, leaf blowers and rakes.

## POLLUTION

Imagine a world in which most of the trees are dead. That world would be plain, even ugly — a world without beauty. It wouldn't be a very pleasant place to live. Many scientists fear that is what our world will be like if we don't do something about pollution.

Both air and water pollution are tough on trees. Pollution can poison a tree's system, slow its growth and even kill it. Pollution happens when human-made and natural wastes dirty the air or water.

Human-made wastes are the main sources of pollution. The greatest air pollution comes from the burning of fuel to power motor vehicles, heat or cool buildings, and power industry. Water pollution is mostly caused by wastes from industry, chemicals and other poisonous substances and household garbage.

## OTHER HUMAN ACTIONS

People can be a tree's best friend, but they are often its worst enemy. Plants and trees need land to grow. People need roads, houses, factories, fields, shopping centers and parking lots. To build these facilities, land often is cleared. The trees remaining are often wounded.

Trees may be wounded in several ways: damage to roots, to bark and to the structure itself (limbs, trunk and leaves). Serious damage to any of these parts can

threaten the tree's health or even its life. Many tree wounds are caused simply because people do not realize their actions can be harmful.

Lawn mowers, digging or grading equipment or even shovels often damage tree roots. Adding soil above the original grade limits the air and moisture available to the roots and often suffocates them. Since the root system of the tree is its primary way of obtaining food, damage to roots can hamper the tree's ability to get water and nutrients. Without these essentials, the tree will die.

Damage to bark occurs through cutting or carving, vehicles crashing into the trunk, fire, animal activity and people attaching things to the tree. Lawn mowers and weed eaters do their share too. Bark has an outer layer which protects the inner living layer. The inner layer carries food made by the leaves to other parts of the tree. This living layer often is damaged. The water conduction tissues are also in this living layer and can be damaged. Bark damage makes the tree more open to disease, rot, and animal and insect invasion.

If bark injuries aren't too serious, uninjured parts of the tree can carry food and water supplies. Bark damage that encircles the tree is called girdling. Girdling usually kills the tree, because the tree cannot move water and food past the damage. Tree guards can help protect against girdling damage from lawn mowers, weed eaters and animals.







## ARBOR DAY POETRY

### TREES

I think that I shall never see  
A poem lovely as a tree.  
A tree whose hungry mouth is prest  
Against the earth's sweet flowing breast;  
A tree that looks at God all day  
And lifts her leafy arms to pray;  
A tree that may in summer wear  
A nest of robins in her hair;  
Upon whose bosom snow has lain;  
Who intimately lives with the rain.  
Poems are made by fools like me,  
But only God can make a tree.

Joyce Kilmer

### A MICROWAVE "TREE COOKIE" RECIPE

1. Slice off a tree cookie as evenly as possible from a log or large branch. For small diameters use a radial arm saw; for large diameters use a hand saw or chain saw. More sanding will be required when using a chain saw.
2. Place the tree cookie in the microwave oven on top of absorbent paper towels. Drying time will vary depending on how green the cookie is, the diameter and the thickness. Dry small samples 2-3 minutes on high; 6-10 minutes for medium samples; up to 20 minutes for large cookies 2 inches thick and 12 inches in diameter.
3. The tree cookie will be moist and warm when done, so allow it to air dry about a half hour before sanding. A power belt sander works best. You may want to hand sand or use a plane to make the rings stand out.
4. Clean the tree cookie (a tack cloth works well) and coat with a polyurethane sanding sealer on both sides.
5. After the sanding sealer has dried, coat with a polyurethane gloss finish.

The sanding sealer and finish are not really necessary but they will prevent the cookies from splitting and it will make the rings much easier to see.

**CAUTION:** Tree cookies will burn and can actually catch on fire if left in the microwave too long. If you do not want to use the microwave, use a dead tree which hasn't started to decay and just follow steps 3-5.

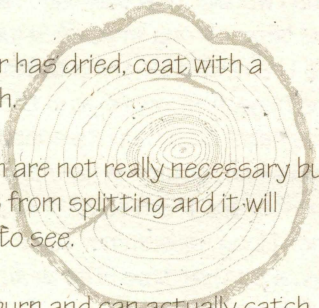
### AN ARBOR DAY TREE

Dear little tree that we plant today,  
What will you be when we're old and gray?  
"The savings bank of the squirrel and mouse,  
For robin and wren an apartment house,  
The dressing room of the butterfly's ball,  
The locusts and katydids concert hall,  
The schoolboy's ladder in pleasant June,  
The schoolgirl's tent in the July noon,  
And my leaves shall whisper them merrily  
A tale of the children who planted me."

Anonymous

### ARBOR DAY

"Tree Planting Day" they called it  
In Nebraska long ago.  
Now we call it Arbor Day, and  
Oh, I love it so!  
I love to plant a growing thing—  
A tree, a shrub, a vine—  
And know it will for years and years  
Keep growing there, a sign  
To children who come after me.  
That someone thought of them,  
And left behind a living friend  
More precious than a gem.  
Betty Foust Smith





## WHY WE KEEP ARBOR DAY

(For seven children)

### First:

Trees of fragrant forest,  
With leaves of green unfurled,  
Through summer's heat, through winter's cold,  
What do you do for our world?

### Second:

Our green leaves catch the raindrops,  
That fall with soothing sound,  
Then drop slowly, slowly down,  
'Tis better for the ground.

### Third:

When rushing down the hillside,  
A mighty freshet forms,  
Our giant trunks and spreading roots  
Defend our happy homes.

### Fourth:

From burning heat in summer,  
We offer cool retreat,  
Protect the land in winter's storm  
From cold, and wind, and sleet.

### Fifth:

Our falling leaves in autumn,  
By breezes turned and tossed,  
Will make a deep sponge carpet warm  
Which saves the ground from frost.

### Sixth:

We give you pulp for paper,  
Our fuel gives you heat;  
We furnish lumber for your homes,  
And nuts and fruits to eat.

### Seventh:

With strong and graceful outline,  
With branches green and bare,  
We fill the land all through the year  
With beauty everywhere.

### All:

So—Listen from the forest  
Each on a message sends  
To children, on this Arbor Day  
We trees are your best friends.

Anonymous

## TREES USED IN GAMES AND SPORTS

Think of all the games you play,  
Baseball, tennis, and croquet,  
Checkers, chess, and dominoes,  
Games that everybody knows.  
And the fun you have in school,  
In the gym and in the pool,  
Racing round the running track,  
Jumping from the springboard's back,  
Thinking of summer sports and fun,  
Fishing, hunting with a gun,  
Climbing trees, and paddling, too,  
In a rowboat or canoe.  
Games and good times by the score,  
Those we've named and many more,  
Each and every one of these  
Depends on wood that comes from trees.

Mary I. Curtis

## TREES

Trees supply me with a lot of good things  
Recording the years by counting the number of rings.  
Everyone knows where I'd like to be  
Exploring the world from up in a tree.  
So that's why trees are important to me!

Cole Giesler

Valle Grade School

St. Genevieve, Mo.

Teacher: Terry Basler

## THE OAK TREE

Sitting in the shade of the old oak tree,  
There I can sit and just be me  
From the large old branches hangs my tire swing,  
Oh what fun it can bring.  
The many green leaves reach to the sky,  
And I wonder how the birds can fly.  
The large strong limbs keep me cool,  
It's the next best thing to being in a pool.  
The huge, firm, roots go in the ground,  
This helps it to keep its sound.  
And when autumn is here the leaves fall down  
You can see them scattered on the ground.  
Then I long for summer to be here  
Because that tree is so dear.

Sammi LaRue

Iron County C-4 School

Viburnum, Mo.

Teacher: Mrs. Mayfield



### IMPORTANCE OF TREES IN MY LIFE

**T** is for Timber with which we build our living space.

**R** is for the Restful shade we enjoy at its base.

**E** is for the Embers that chase the chill away.

**E** is for the Evening breeze that makes the branches sway.

**S** is for the Shelter for creatures great and small.

**TREES** are God's creation, made for us all!

Adam Grove

Monroe City R-1 Elementary

Monroe City, Mo.

Teacher: Mrs. Chitwood

### I AM A WILLOW

I am a Willow

I am a droopy plant

Come sit and have some water with me

I am old, strong, and very wise

I feel bird's nests and bugs

I keep secrets in my trunk

I shelter people and animals

I know I am old and will rot soon

I sense cold weather ahead

I dream good dreams

I am a tree

I am free

Come imagine you're a tree with me!

Chelsea Vièceli

Mark Twain Elementary

Springfield, Mo.

Teacher: Mrs. Peggy Morrow

### TREE DIAMANTE

Trees

short, tall

swinging, blowing, flowing

ash, maple, red oak, and red maple

rustling, producing, growing

large, small

Forests

Joshua Mince

Hermann Elementary School

Hermann, Mo.

Teacher: Mrs. Joyce Scad

### DREAM

I dreamed I was a tree.

I was made into paper.

I am found in a book.

Children read and learn from me.

I am here because someone planted me.

Anthony Gianino

Labadie Elementary

Labadie, Mo.

Teacher: Mrs. Scheer

### COLORS

Trees can be many colors,

It depends on what you see.

They can be all colors like a rainbow,

Or two colors like a bee.

They can stand tall around the houses,

Or stand tall on the country side.

They can grow crooked from the roots,

Or grow straight up with pride.

Jannelle Brandt

St. Joseph School

Salisbury, Mo.

Teacher: Mrs. Debbie Grotewill

### TREE

I dreamed I was an old oak tree.

I was losing my leaves,

On the forest floor.

My old leaves blowing around,

The wind swishing by and taking my leaves with it.

Sara Swatzell

Blackburn Elementary

Independence, Mo.

Teacher: Mrs. LaRue



# Plant a Tree

Music by Luce Myers  
Lyrics by Tom Nichols

1 C G

Plant a tree (echo) in the Spring - time, Plant a  
(Plant a tree) (in the Spring time)

4 C

tree and watch it grow. Plant a tree in the  
(Plant a tree) (and watch it grow) (Plant a tree)

7 F C G

Au - tumn Be - fore the cold snow - y winds blow. Do your -

10 F C

self (Do yourself) One small fa - vor (one small favor) Do it for

12 G C C7

you, (Do it for you) Do it for me (Do it for me) Put down some

14 F C Amin

roots (Put down some roots) that will stay there. Can ya  
(that will stay there)

16 G

dig it Can ya dig it, (Can ya dig it!) Plant a

18 C

tree.

Note Progression; (Calypso beat)  
EED, FFE, DCDE EEG, FFE, DCBC  
EED, FFE, DCDE CDEEG, FFE, DCBC

## VERSE 1

Some people say that a tree is a thing  
Its only worth what the market will bring  
Other folks say that a tree is alive  
Like the bird on the wing  
Or the bee in the hive

## VERSE 2

Come out with me and we'll dig with a shovel  
I know its work, but it's worth all the trouble  
The tree gets a home and someday we will say:  
"I planted that tree!" as we sit in its shade

( Audio cassettes available: 12476 cty rd. 7530; Newburg, MO 65550 )

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# Trees for America™

Words and Music by :  
John Denver  
Timmy Tappan  
Craig Deitschmann

1 Plant a tree for your to - mor - row. It's your

4 tree that clears the air. Plant a tree, trees for A -

7 mer - i - ca. Plant a tree to - day for all the world to

9 share. Taste the breeze, it's life in - side you. Make a

11 pro - mise to the earth, plant a tree, now is the time to rec - og - nize

13 a tree for all that it is worth. Plant a

15 tree for your to - mor - row. Plant a

17 tree that clears the air. Plant a tree, trees for a -

20 mer - i - ca. Plant a tree to - day for all the world to share.



## ADVENTURES IN READING

### CHILDREN'S BOOKS:

Brenner, Barbara and Mary Barelick. *The Tremendous Tree Book*. Four Winds Press: 1979.

Information on identifying trees, leaves, food (photosynthesis), history, sizes, seeds, animal habitats, benefits of trees for forest, food, soil and our uses.

Clement, Claude. *The Voice of the Wood*. Dial Books: 1989.

A read-aloud story of a craftsman in Venice, Italy who loves the melody of the tree and birds outside his window. The tree dies, he makes it into a cello that only one who plays music from the heart can play.

Day, Jennifer. *What Is a Tree?* Macmillan: 1983.

An easy-to-read book that describes different trees, their leaves, bark, flowers and seeds.

Giesel, Theodore. *The Lorax*. Random House: 1971.

Story of how ecological damage is brought to an area by uncontrolled progress.

Giorno, Jean and Michael McCurdy. *The Man Who Planted Trees*. Chelsea Green Publishing: 1954, 1982.

The story of a legendary shepherd in France who plants 100 acorns each day in a barren land until he has reforested the countryside.

Hamer, Marty. *Trees*. Franklin Watts Ltd.: 1983.

This easy-to-read fact book takes a look at all the different functions of a tree.

Hindley, Judy. *The Tree*. Clarkson N. Potter, Inc.: 1990.

This book explores twelve different trees, their lore, their place in our lives and their practical uses.

Hunt, Angela. *The Tale of Three Trees*. Lion Publishing: 1989.

Read-aloud children's book. Tells how three trees dreamed of greatness and relates to how all the trees play a part in the life of Jesus Christ.

Lauber, Patricia. *Be a Friend to Trees*. Harper-Collins: 1994.

A nonfiction book that discusses the importance of trees as a source of food, oxygen and other important things.

Morel, Gaud. *Nature's Timekeeper - the Tree*. Young Discovery Library: 1992.

Describes trees, their parts, and their benefits to the environment.

Newton, James R. *Forest Log*. Thomas R. Crowell Co.: 1980.

The evocative text and detailed drawings tell about a unique biological community and the role that every tree plays when it falls.

Parnall, Peter. *Woodpile*. Macmillan Publishers: 1990.

From this woodpile pieces of wood are a piece of history, a home for many animals, parts of schooners and tongue depressors.

Podendorf, Illa. *Trees*. Children's Press: 1982.

An introduction to trees, their parts and shapes, uses of trees and how to protect trees.

Romanova, Natalia. *Once There Was a Tree*. Dial Books: 1986.

It is the tale of a tree split by lightning, then felled by a woodsman so that only the stump remains. Different animals use the stump and though each tries to claim it, the stump is part of the earth and the earth belongs to all.

*Trees and Forests*. Scholastic Books: 1995.

Interactive, hands-on book that looks at trees and forests throughout time from the first plants to modern cultivated tree farms. This book covers a wide variety of topics such as trees and their relationships to different cultures, continents, uses, ecosystems, etc.

Silverstein, Shel. *The Giving Tree*. Harper Collins Children's Books: 1964.

Story of a relationship between a man and his tree throughout the man's life.

Van Allsburg, Chris. *Just a Dream*. Houghton Mifflin: 1990.

Walter is careless with his environment and in his dreams he sees the effects that his actions can have on the future.

### REFERENCE BOOKS:

Burn, Barbara. *North American Trees*. Nature Series Crown Publishers: 1984.

The National Audubon Society Collection. Through colorful photographs this book describes trees that are native to North America. Detailed text, excellent photographs.

Caduto, Michael J. and Joseph Bruchac. *Keepers of The Earth*. Fulcrum, Inc.: 1989.

Teacher's resource featuring American Indian stories with related hands-on activities to help the children feel a part of their surroundings.

Denison, Edgar and Bruce Palmer. *Missouri's Oaks and Hickories*. Conservation Commission of the State of Missouri: 1994.

A useful resource describing the oaks and hickories found in Missouri and their use for manufacturing, wildlife habitat, recreation, water quality and beauty.



Palmer, Bruce. *Missouri Conservation Trees and Shrubs*. Missouri Department of Conservation: 1995.  
A guide to many of the species grown at the state nursery near Licking, Mo. This reference contains descriptions and characteristics of different species, seedling care and planting procedures.

Pokorny, Jaromir. *A Color Guide to Familiar Trees, Leaves, Bark and Fruit*. Octopus Books Limited: 1984.  
A reference guide with pictures to different trees. Shows leaves/needles, fruit and bark of trees.

Russo, Monica. *The Tree Almanac - A Year-Round Activity Book*. Sterling: 1993.  
An introduction to trees throughout the seasons and suggested activities to follow the seasons.

Sheehan, Kathryn and Mary Waidner. *Earthchild*. Council Oak Books: 1991.  
Teacher's resource book full of games, stories, activities, experiments, and ideas about living lightly on planet Earth.

Wiggers, Raymond. *Picture Guide to Tree Leaves*. Franklin Watts: 1991.  
Uses photos to show how different trees can be identified.

Wylie, J. E. and Ramon Gass. *Missouri Trees*. Missouri Department of Conservation: 1989.  
Guide to different tree species found in Missouri. Includes photographs of leaves, bark, buds, and seeds.

#### VIDEOS:

*Down on the Forest Floor*. Missouri Department of Conservation. 14 minutes.  
Focuses on how life on the forest floor adapts to changing seasons.

*Forest Ecology and Wilderness*. Mark Twain National Forest. 21 minutes.  
How the forest is a series of systems that must work together.

*How Plants Grow*. Missouri Department of Conservation. 17 minutes.  
Deals with the life cycle of plants.

*The Lorax*. 24 minutes.  
Based on the book by Theodore Geisel (Dr. Seuss). Story of how ecological damage is brought to an area by uncontrolled progress.

*The Man Who Planted Trees* by Jean Giono.  
The story of a legendary shepherd in France who plants 100 acorns a day until he has reclaimed a barren patch of countryside.

*Missouri Outdoors TV Story Collections - Urban Forestry*. Missouri Department of Conservation.  
Short 3 to 5 minute videos with these titles: Tree Planting, Arbor Day, Front Yard Forestry, Urban Arborist Contest, Backyard Tree Farms, Day in the Forest.

*Missouri Outdoors TV Story Collections - Wood Forest Products II*. Missouri Department of Conservation.  
Short 2 to 5 minute videos with these titles: Barrel Making, Charcoal Production, Hickory Handle Making, Hickory Handicraft, White Oak Basketry, Maple Syrup Tradition, Steam Sawmill, Sawsmith, Saw Doctor.

*More Than Trees*. Missouri Department of Conservation. 30 minutes.  
Explores the relationships of forest plants and animals, both above and below ground.

*The Puzzle of the Rotting Log*. Missouri Department of Conservation. 12 minutes.  
Focuses on what contributes to the decomposition of a log and how it enriches the soil.

*Stamp of Character*. Missouri Department of Conservation. 23 minutes.  
A look at a railroad tie drive on the Black River in the 1920s.

Videos available through the Missouri Department of Conservation may be obtained by contacting the Media Library:

#### MISSOURI DEPARTMENT OF CONSERVATION

Media Library  
P.O. Box 180  
Jefferson City, MO 65102-0180

Phone: 573/751-4115 ext. 205  
FAX: 573/751-2260



## TREE TRUNKS

Tree Trunks are resource kits to help educators teach about trees and forestry. Items in the trunk can enhance Project Learning Tree activities or be used with other lesson plans. Each Tree Trunk contains: an activity guide with lessons; tree cookies; videos; field guides; leaf, twig and seed ID kits; measuring tools; magnifiers and more. Tree Trunks are available at 28 locations around the state. They may be checked out for two weeks at a time and must be picked up and returned by the educator.

## TREE TRUNK LOCATIONS

### CAMDENTON

Conservation Service Center  
Route 2 Box 247 (Lake Road 5-88)  
573/346-2210

### CAPE GIRARDEAU

Conservation Service Center  
2302 County Park Drive  
573/290-5730

### CHILLICOTHE

Conservation Service Center  
Route 1 Box 122B  
816/646-6122

### COLUMBIA

Conservation District Office  
1907 Hillcrest Drive  
573/884-6861

### HANNIBAL

Conservation Service Center  
653 Clinic Road  
573/248-2530

### JEFFERSON CITY

Runge Conservation Nature Center  
Highway 179  
573/526-5544

### KANSAS CITY AREA

Burr Oak Woods Conservation  
Nature Center  
1401 NW Park Road, Blue Springs  
816/228-3766

Kansas City Zoo  
6700 Zoo Drive, Kansas City  
816/871-5705

Martha Lafite Thompson  
Nature Sanctuary  
407 N. Lafrenz Road, Liberty  
816/781-8598

Powell Gardens  
1609 NW US Hwy 50, Kingsville  
816/697-2600

University Extension Center  
1901 NE 48th St., Kansas City  
816/792-7690

### KIRKSVILLE

Conservation Service Center  
2500 S. Halliburton  
816/785-2420

### MALDEN

Bootheel Youth Museum  
700A N. Douglas  
573/276-3600

### MARYVILLE

University Extension Center  
305 N. Market  
816/582-8101

### NEOSHO

District Forestry Office  
1510 S. Hwy. 71  
417/451-4158

### NEVADA

University Extension Center  
First Floor, Court House  
417/448-2560

### PIEDMONT

District Forestry Office  
Route 1 Box 1002  
573/223-4525

### POTOSI

Potosi Ranger District  
Highway 8 West  
573/438-5427

### ROLLA

Rolla Ranger District  
401 Fairgrounds Road  
573/364-4621

### ST. JOSEPH

Conservation Service Center  
701 NE College Drive  
816/271-3100

### ST. LOUIS AREA

Busch Wildlife Area  
2360 Hwy D, St. Charles  
314/441-4554

Powder Valley Conservation  
Nature Center  
11715 Cragwold Road, Kirkwood  
314/301-1500

Rockwoods Reservation  
2751 Glencoe Road, Glencoe  
314/458-2236

St. Louis Co. Soil & Water  
Conservation District  
1215 Fern Ridge Pkwy., St. Louis  
314/453-9811

Rivers Project Office,  
Corps of Engineers  
P.O. Box 337, West Alton  
314/355-6585

### SPRINGFIELD AREA

Springfield Conservation  
Nature Center  
4600 S. Chrisman  
417/888-4237

Conservation Service Center  
2630 N. Mayfair  
417/895-6880

### WEST PLAINS

Conservation Service Center  
618 Preacher Roe Blvd.  
417/256-7161



## SOURCES OF INFORMATION

### MISSOURI RESOURCES:

#### **BURR OAK WOODS CONSERVATION NATURE CENTER**

1401 NW Park Road  
Blue Springs, MO 64015  
816/228-3766

#### **CONSERVATION FEDERATION OF MISSOURI**

728 West Main  
Jefferson City, MO 65101  
573/634-2322

#### **GEORGE O. WHITE STATE FOREST NURSERY**

14027 Shafer Road  
Licking, MO 65542  
573/674-3229

#### **MARK TWAIN NATIONAL FOREST**

Supervisor's Office  
401 Fairgrounds Road  
Rolla, MO 65401  
573/364-4621

#### **MISSOURI BOTANICAL GARDEN**

4344 Shaw  
St. Louis, MO 63110  
314/577-9400

#### **MISSOURI DEPARTMENT OF CONSERVATION**

P.O. Box 180  
Jefferson City, MO 65102-0180  
573/751-4115

#### **MISSOURI DEPARTMENT OF NATURAL RESOURCES**

Technical Assistance Program  
P.O. Box 176  
Jefferson City, MO 65102  
800/334-6946

#### **MISSOURI FOREST HERITAGE CENTER**

611 East Capitol  
Jefferson City, MO 65101  
573/634-6002

#### **MISSOURI FORESTKEEPERS NETWORK**

4207 Lindell Blvd., Suite 120  
St. Louis, MO 63108  
888/936-7378

#### **MISSOURI FOREST PRODUCTS ASSOCIATION**

611 East Capitol  
Jefferson City, MO 65101  
573/634-3252

#### **MISSOURI PROJECT LEARNING TREE**

P.O. Box 180  
Jefferson City, MO 65102-0180  
573/751-4115

#### **MISSOURI PROJECT WET**

Technical Assistance Program  
P.O. Box 176  
Jefferson City, MO 65102  
800/334-6946

#### **MISSOURI PROJECT WILD**

P.O. Box 180  
Jefferson City, MO 65102-0180  
573/751-4115

#### **MISSOURI URBAN AND COMMUNITY FORESTRY ADVISORY COUNCIL**

P.O. Box 180  
Jefferson City, MO 65102  
573/751-4115

#### **POWELL GARDENS**

1609 NW US Highway 50  
Kingsville, MO 64061  
816/697-2600

#### **POWDER VALLEY CONSERVATION NATURE CENTER**

11715 Cragwold Road  
Kirkwood, MO 63122  
314/301-1500

#### **RUNGE CONSERVATION NATURE CENTER**

2901 West Truman Blvd.  
P.O. Box 180  
Jefferson City, MO 65102  
573/526-5544

#### **SPRINGFIELD CONSERVATION NATURE CENTER**

4600 S. Chrisman  
Springfield, MO 65804  
417/888-4237

### ADDITIONAL INFORMATION AND MATERIALS:

#### **AMERICAN FOREST FOUNDATION**

1111 19th Street, NW, Suite 780  
Washington, DC 20036  
202/463-2462

#### **AMERICAN FORESTS**

P.O. Box 2000  
Washington, DC 20013-2000  
202/667-3300

#### **AMERICAN FOREST AND PAPER ASSOCIATION**

1111 19th Street, NW, Suite 800  
Washington, DC 20036  
202/463-2700

#### **INTERNATIONAL SOCIETY OF ARBORICULTURE**

P.O. Box GG  
Savoy, IL 61874  
217/355-9411

#### **NATIONAL ARBOR DAY FOUNDATION**

100 Arbor Ave.  
Nebraska City, NE 68410  
402/474-5655

#### **NATIONAL AUDUBON SOCIETY**

700 Broadway  
New York, NY 10003  
212/979-3000

#### **NATIONAL WILDLIFE FEDERATION**

1400 Sixteenth Street, NW  
Washington, DC 20036-2266  
202/797-6800

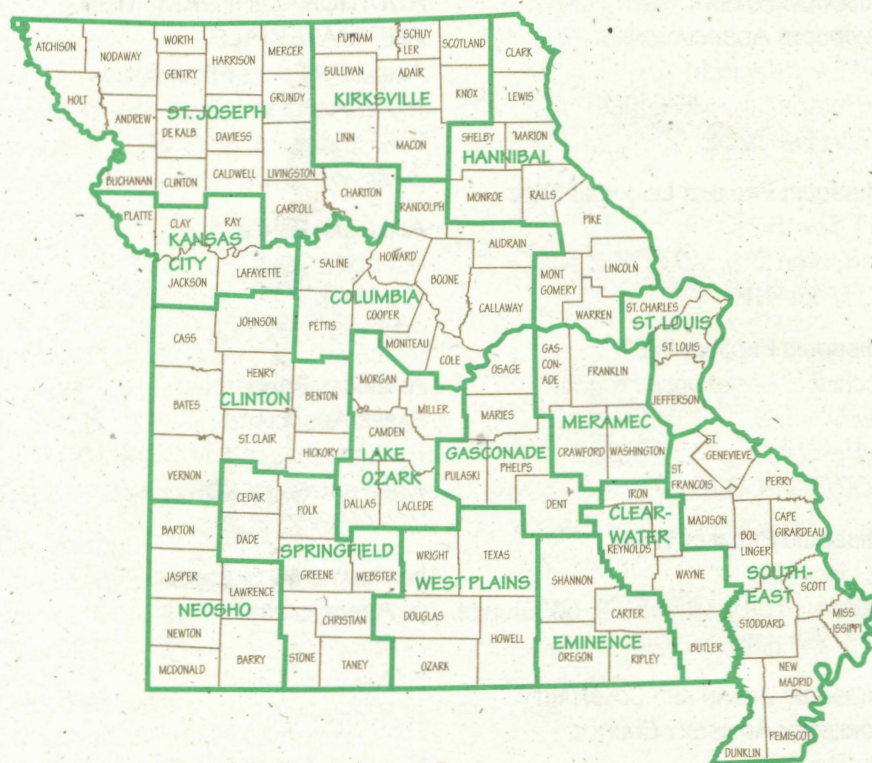
#### **SOCIETY OF AMERICAN FORESTERS**

5400 Grosvenor Lane  
Bethesda, MD 20814-2198  
301/897-8720



# MISSOURI DEPARTMENT OF CONSERVATION

## FOREST DISTRICTS



### MERAMEC FOREST DISTRICT

P.O. Box 248  
(Jct. Bus. I-44 & 185 S)  
Sullivan, MO 63080  
573/468-4157

### NEOSHO FOREST DISTRICT

1510 S. US Highway 71  
Neosho, MO 64850  
417/451-4158  
417/781-2811

### SOUTHEAST FOREST DISTRICT

2302 County Park Drive  
Cape Girardeau, MO 63701  
573/290-5730

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2630 N. Mayfair  
Springfield, MO 65803  
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St. Joseph, MO 64507  
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2751 Glencoe Road  
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P.O. Box 138 (618 Preacher Roe Blvd.)  
West Plains, MO 65775  
417/256-7161

### STATE FORESTER

P.O. Box 180  
(2901 W. Truman Blvd.)  
Jefferson City, MO 65102  
573/751-4115

### CLEARWATER FOREST DISTRICT

Route 1 Box 1002 (Hwy. 34 E)  
Piedmont, MO 63957  
573/223-4525

### CLINTON FOREST DISTRICT

P.O. Box 250 (2010 S. 2nd)  
Clinton, MO 64735  
816/885-6981

### COLUMBIA FOREST DISTRICT

1907 Hillcrest Drive  
Columbia, MO 65201  
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### EMINENCE FOREST DISTRICT

P.O. Box 755 (Hwy. 19 N)  
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### GASCONADE FOREST DISTRICT

P.O. Box 1128 (12655 State Rt. Y)  
Rolla, MO 65401  
573/368-2225

### HANNIBAL FOREST DISTRICT

P.O. Box 428  
(Tower Plaza, 653 Clinic Road)  
Hannibal, MO 63401  
573/248-2530

### KANSAS CITY FOREST DISTRICT

1401 NW Park Road  
Blue Springs, MO 64015  
816/228-3766

### KIRKSVILLE FOREST DISTRICT

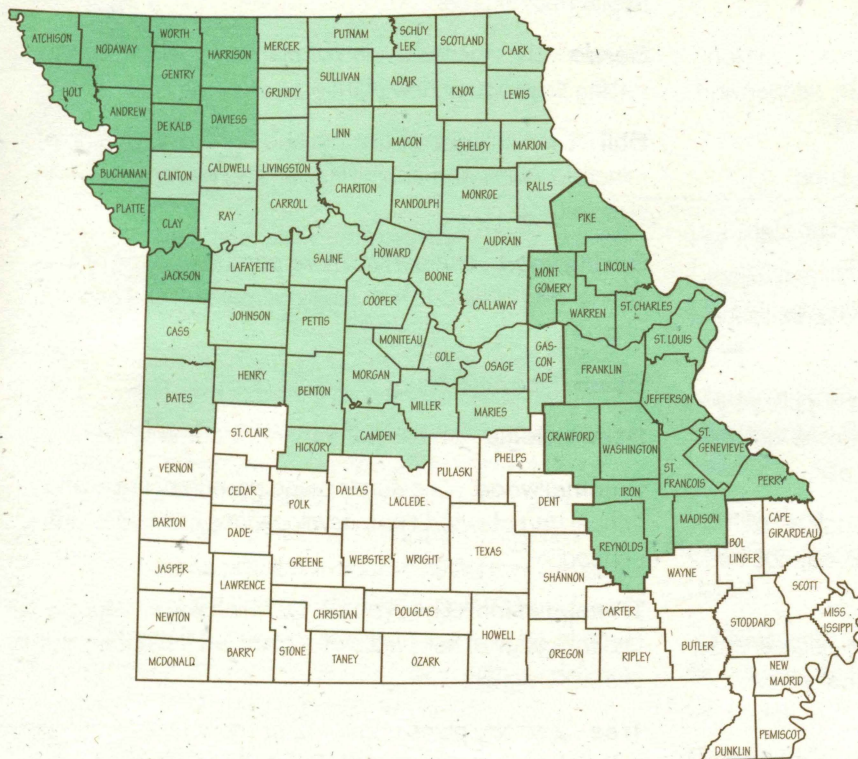
2500 S. Halliburton  
Kirksville, MO 63501  
816/785-2420

### LAKE OZARK FOREST DISTRICT

Route 2 Box 247 (Lake Rd. 5-88)  
Camdenton, MO 65020  
573/346-2210



## EDUCATION DISTRICTS



- **CENTRAL/NORTH MISSOURI EDUCATION DISTRICT**  
 1907 Hillcrest Drive  
 Columbia, MO 65201  
 573/884-6861
- **ST. LOUIS EDUCATION DISTRICT**  
 Powder Valley Nature Center  
 11715 Cragwood Road  
 Kirkwood, MO 63122  
 314/301-1500
- **KANSAS CITY EDUCATION DISTRICT**  
 Brywood Shopping Center  
 8616 E. 63rd Street  
 Kansas City, MO 64133-4725  
 816/356-2280
- **SPRINGFIELD/SOUTH MISSOURI EDUCATION DISTRICT**  
 2630 N. Mayfair  
 Springfield, MO 65803  
 417/895-6880

## GLOSSARY

**Absorb** - to suck up, incorporate, take in by capillary action.

**Air** - the mixture of invisible, odorless, tasteless gases (such as nitrogen and oxygen) that surrounds the earth.

**Annual Ring** - the layer of wood produced by a single year's growth of a woody plant.

**Bark** - the tough exterior covering of a woody root or stem.

**Bud** - a small swelling on the stem of a plant from which a shoot, leaf or flower will grow.

**Cambium** - a thin layer of living, dividing cells just under the bark of trees. This layer gives rise to the tree's secondary growth.

**Chlorophyll** - a group of pigments that produce the green hue of plants, essential to photosynthesis.

**Conservation** - the wise use of natural resources in a way that assures their continuing availability to future generations.

**Crown** - the top branches of a tree.

**Deciduous** - describes a plant that periodically (typically

in autumn) loses all its leaves. Most North American broadleaf trees are deciduous. A few conifers, such as larch and baldcypress, are also deciduous.

**Decomposition** - the breakdown or decay of organic matter through the digestive processes of microorganisms, macroinvertebrates and scavengers.

**Deforestation** - the permanent replacement of forests by non-forest uses.

**Dendrochronology** - the science of dating events in the environment by studying growth rings in trees and wood.

**Dormant** - the slowing down of activity and growth during a certain period of time.

**Drought** - an extended period of time with little or no precipitation.

**Economy** - the control of money that is earned in a home, business or government.

**Evergreen** - a plant that retains its leaves all year round.

**Future** - a time yet to come.

**Germinate** - the growth of a seed, the development of a seedling from a seed.



**Goods** - things that can be bought and sold, something that satisfies an economic want.

**Heartwood** - the older, harder, nonliving central portion of wood of some trees that is usually darker, denser and more durable than the surrounding sapwood.

**Interdependent** - to depend upon one another.

**Life Cycle** - the phases, changes or stages through which an organism passes during its lifetime.

**Mineral** - a naturally occurring inorganic material found in the Earth's crust.

**Natural Resources** - those raw materials supplied by the Earth and its processes. Natural resources include nutrients, minerals, water, plants, animals, etc.

**Nonrenewable Resources** - substances such as oil, gas, coal, copper and gold, which, once used, cannot be replaced in this geological age.

**Perpetual Resources** - resources such as solar energy, geothermal energy and tides, that are virtually inexhaustible on a human time scale.

**Phloem** - the plant tissue that transports dissolved nutrients from the leaves to the other parts of the plant. Also called the **inner bark**.

**Photosynthesis** - the process by which green plants manufacture simple sugars in the presence of sunlight, carbon dioxide and water.

**Proclamation** - an official, formal, public announcement.

**Renewable Resource** - a naturally occurring raw material or form of energy which has the capacity to replenish itself. Agricultural crops, wildlife and trees are examples of renewable resources.

**Root Hairs** - very tiny roots that grow near the tip of the root that absorb water and minerals.

**Root Tip** - the very end of the root that is responsible for adding new growth to the root.

**Sap** - the fluid part of a plant, or more specifically, the material transported via the xylem and the phloem of a tree.

**Sapling** - a young tree normally more than 4 1/2 feet (1.5 m) tall and less than 4 inches (10 cm) in diameter.

**Sapwood** - the younger, softer, living outer portion of a tree's wood that lies between the cambium and the heartwood. The tree's water and nutrient needs are transported within the sapwood.

**Seedling** - a young tree grown from a seed up to a sapling-sized tree.

**Seeds** - the ripened ovules of plants capable of germinating to produce new plants.

**Soil** - the top layer of the Earth's surface made up of minerals, plant and animal life, air and water which can support life.

**Springwood** - the softer, more porous portion of an annual ring of wood that develops early in the growing season.

**Stem** - the main trunk of a tree or other plant.

**Stewardship** - the act of caring for our environment.

**Summerwood** - the denser, less porous portion of an annual ring of wood that develops late in the growing season.

**Transpiration** - the process by which water vapor leaves the foliage or other parts of a plant and is released into the atmosphere.

**Tree** - a woody plant usually 12 or more feet (4 or more m) tall with a single main stem (trunk) and a more or less distinct crown of leaves.

**Tree Cross Section** - a section cut from a tree at right angles to its length, used to examine the xylem, cambium, phloem and bark. Often called a tree cookie.

**Trunk** - the main stem of a tree.

**Urban Forests** - trees and forests within a city landscape.

**Xylem** - the complex woody tissue of higher plants that includes systems for transporting water, storing nutrients and structural support.





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Jerry Conley, Director  
Marvin D. Brown, State Forester

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Department of the Interior  
Washington, DC 20240

and

Missouri Department of Conservation  
P.O. Box 180  
Jefferson City, MO 65102

Written by: Christine Schmidgall  
Contributors: Frances Dilsaver, Justine Gartner, Janice Schnacke Greene and Bruce Palmer  
Edited by: Bruce Palmer and Julia Vowell  
Design by: Tracy Ritter  
Illustrations by: Diana Jarrell, Dale Larison,  
David Besenger and Mark Raithel  
Photography by: Jim Rathert and Cliff White

Field Testers:

Cindy Campbell  
St. Patrick School  
Rolla

Mary Ann Holifield  
Hillsboro Middle School  
Hillsboro

Dennig Page  
Cecil Floyd School  
Joplin

Julie Rogers  
St. Monica School  
St. Louis

Patricia Vollmer  
Lawson Elementary School  
Jefferson City

Nina Wiederholt  
Maryville R-2 School  
Maryville



